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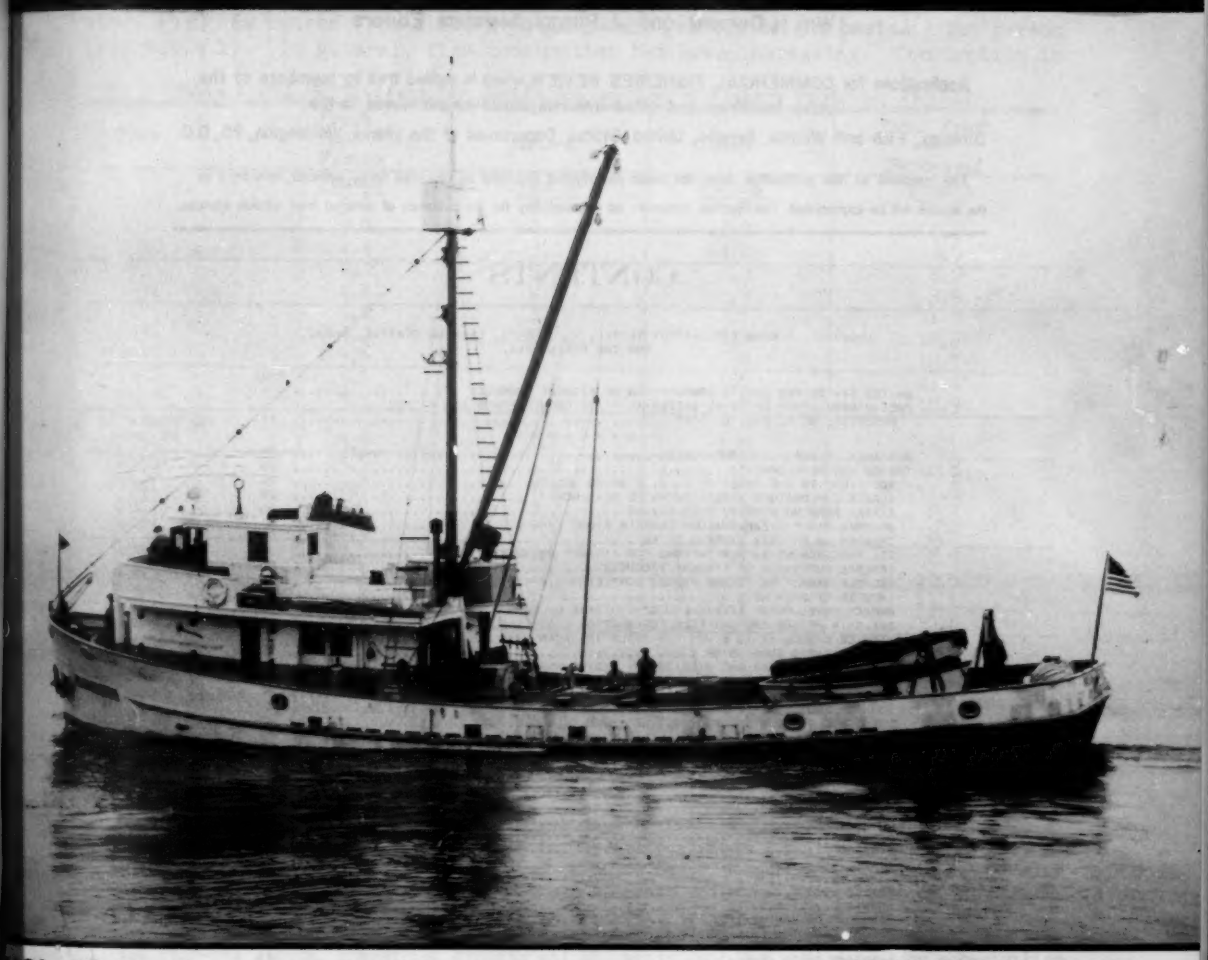
COMMERCIAL FISHERIES REVIEW



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United States Department of the Interior
Washington, D.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
J.A.KRUG, Secretary

FISH AND WILDLIFE SERVICE
ALBERT M. DAY, Director

COMMERCIAL FISHERIES REVIEW

A REVIEW OF DEVELOPMENTS AND NEWS OF THE FISHERY INDUSTRIES
PREPARED IN THE BRANCH OF COMMERCIAL FISHERIES

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Applications for COMMERCIAL FISHERIES REVIEW, which is mailed free to members of the fishery industries and allied interests, should be addressed to the Director, Fish and Wildlife Service, United States Department of the Interior, Washington, 25, D.C.

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COMMERCIAL FISHERIES REVIEW

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UNITED STATES PER CAPITA CONSUMPTION OF FISHERY PRODUCTS[1/]

INTRODUCTION

The annual consumption[2/] of fishery products in the continental United States since 1930 has ranged from about 8 to 12 pounds (edible weight basis[3/]) per person (see Table 1). In general, fish consumption has been increasing. Consumption in

Table 1 - U. S. Civilian Per Capita Consumption of Fishery Products, 1930-47

Year	Fresh and Frozen	Canned	Cured	Total fresh and Processed
	Pounds	Pounds	Pounds	Pounds
1930	5.9	3.3	1.3	10.5
1931	5.0	3.2	1.0	9.2
1932	4.4	3.4	1.1	8.9
1933	4.2	3.9	.9	9.0
1934	4.4	4.2	.9	9.5
1935	5.2	4.7	1.1	11.0
1936	5.2	5.8	1.0	12.0
1937	5.6	4.2	.9	10.7
1938	5.3	4.8	1.0	11.1
1939	5.4	4.6	.9	10.9
Average 1935-39	5.3	4.8	1.0	11.1
1940	5.7	4.2	.9	10.8
1941	6.3	4.7	.8	11.8
1942	5.3	2.2	.8	8.3
1943	5.6	1.9	.7	8.2
1944	5.6	2.6	.7	8.9
1945	7.1	2.6	.9	10.6
1946	6.3	3.8	1.0	11.1
1947	6.2	3.8	.8	10.8

1931 dropped more than a pound per capita below the 1930 level of 10.5 pounds, and declined again by almost a half pound during 1932. From that time on, the trend was upward until the onset of World War II. After a 3½-pound decline from the previous year in 1942 due to unusually large canned fish purchases for military agencies and export to allied nations, consumption again increased and by 1946, the prewar consumption level was regained.

1/ Excerpted from article, "Supply and Distribution of Fishery Products in the Continental United States, 1930-47", which appeared in the National Food Situation, July-September 1948. The study and article was prepared by Harry Sherr, Bureau of Agricultural Economics, in cooperation with Edward A. Power, Richard A. Kahn, and other specialists of the Branch of Commercial Fisheries, Fish and Wildlife Service.

2/ Civilian consumption is a residual figure, obtained after subtracting from total supplies: the year-end stocks, commercial exports and shipments, and the procurement by non-civilian agencies.

3/ Edible weight is the weight of the edible portion of the fin fish, mollusk, or crustacean. See Appendix.

Notes: The civilian consumption estimates indicated in this study are lower than those previously used because the latter (a) include the catch of sports and game fish by individuals, and (b) were calculated on the basis of marketed weight. The per capita consumption of fish caught by sport fishermen was previously estimated at 2.0 pounds.
See "Consumption of Fishery Products in Canada" in October 1948 issue of Commercial Fisheries Review, page 37.

The general upward trend in fish consumption from 1932 to 1941 is due principally to technological advances and increased efficiency in the processing and distribution of fish. In the past, fish consumption was heaviest in the coastal areas of the United States. With the development of better production machinery, new methods of preparing and preserving fish by freezing, improved means of transportation, and more adequate local storage facilities, more commercial fishery products have been successfully merchandized in inland areas.

In addition, wartime scarcities of several foods and postwar increases in meat prices resulted in increased fish consumption for a large segment of the population and provided an opportunity for many people to become more accustomed to eating fish and fishery products. Recent studies in about 20 large inland cities have indicated that consumers prefer commercially frozen or packaged fish to locally caught fresh fish.

Food consumption per capita by United States civilians in 1948 will be slightly lower than last year, but still about 12 percent above the 1935-39 average. For 1948 as a whole, increases from last year's rate of per capita consumption are indicated for fresh and frozen fish, evaporated milk, margarine, and canned fruits and juices. These are more than offset by the decline in the available supplies of meats, chicken and turkey, ice cream, butter, fresh deciduous fruits, fresh vegetables, sweet potatoes, corn products, and sugar. Supplies of most livestock products are down from the highs of recent years, but still above the consumption rates of the late 1930's.

For only a few items is the per capita consumption rate falling below the prewar, 1935-39 average. These commodities are canned fish, sweet potatoes, butter, and perhaps shortening and other edible fats and oils.

FISH CONSUMPTION EXPECTED TO INCREASE

Civilian consumption of fish in 1948 is expected to exceed the per capita rate of 10.8 pounds (edible weight) of the previous year. Fresh and frozen fish consumption is likely to account for a large part of the increase. The relatively high price of other high protein foods probably will continue to encourage increased consumption of fishery products.

Civilian consumption of fish, especially fresh and frozen, during the remainder of the year is expected to be larger than it was during the same months of 1946 and 1947. Total supplies of fishery products during the latter part of 1948 probably will be much larger than a year earlier since consumer demand at prevailing prices is likely to encourage more extensive production activity and larger imports. However, canned fish supplies may not be much greater than last year. Although the 1948 production season is not yet in full swing, canned tuna production is about the same as in the comparable period last year, but the output of salmon and sardines (pilchards and Atlantic sea herring) is lower.

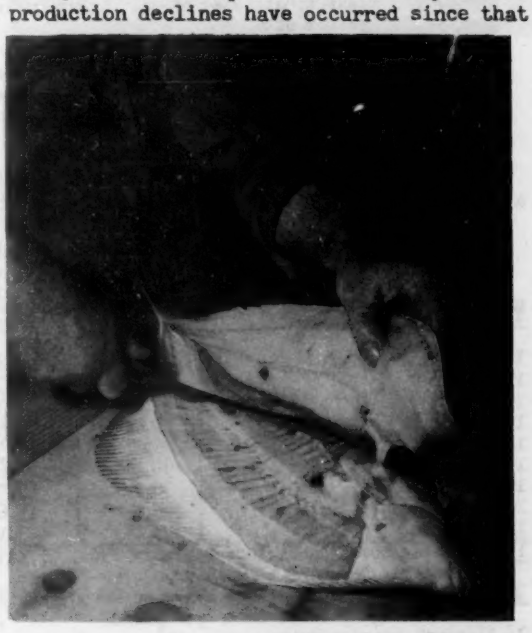
CONSUMPTION OF OTHER PROTEIN FOODS

For the year 1948 as a whole, civilian meat consumption is expected to average about 145 pounds per person (dressed meat basis), approximately 10 pounds less than the 155 pounds consumed in 1947, but almost 20 pounds greater than average consumption in 1935-39. For 1948 as a whole, egg consumption will about equal the near record 380 eggs (47.5 pounds) consumed per person in 1947. Supplies of chicken are expected to be somewhat smaller from now until early spring than they were in the same 1947-48 period. For 1948 as a whole, chicken consumption will be slightly lower than the 23.4 pounds per person (dressed weight) consumed in 1947. Supplies of turkey for the 1948 Thanksgiving and Christmas holiday season will be the smallest since the late 1930's. For 1948 as a whole, consumption will be slightly over 3 pounds per person, compared with the record of 4.5 pounds in 1947 and 1935-39 average of 2.6 pounds.

SUPPLIES

Production[4/]

Production of fish and fishery products in the United States and Alaska has increased since 1930, the second year complete and adequate data on output were available (see Table 2). Occasional production declines have occurred since that time, but they were relatively short lived and output recuperated fairly rapidly. Except for 1942, the annual catch of fishery products since 1934 has totaled at least 4 billion pounds (round weight basis[5/]). In 1941, the record catch of 5.1 billion pounds (round weight basis) was established. During the war years, 1942-45, production was maintained at a relatively high level through the recruitment of persons not previously engaged in the fishery industry, longer hours of work and through the intensive use of available production facilities.



FILLETING FLOUNDER

In general, fish production is seasonal--about 70 percent of the catch is made from May through October. Except for legal restrictions imposed by some States, weather conditions and the availability of fish are among the important factors which determine the length of the fishing season for individual species.

There are seven major fish producing areas in the continental United States. Because of the nature of the local fishery resources, each of these areas tends

4/ Production includes only the reported catch of fin fish and shellfish by domestic commercial fishermen.

5/ Round weight, except for mollusks, is the weight of the fish as landed. Catch statistics for mollusks are on a "meat" basis.

to specialize in a limited number of species of fish caught, and a limited number of forms in which the fish are marketed. These areas are:

1. New England States--Fresh and processed fish and shellfish--groundfish (cod, haddock, hake, pollock, and cusk), rosefish, flounder, sardines (Atlantic sea herring), whiting, clams, lobsters, and scallops.

2. Middle Atlantic States--Fresh fish and shellfish--butterfish, flounder, haddock, mackerel, scup (porgy), shad, sea trout, whiting, clams, and oysters.

3. Chesapeake Bay area--Fresh fish and shellfish--croaker, scup (porgy), shad, sea trout, striped bass, crabs, and oysters.

4. South Atlantic States--Fresh fish and shellfish--bluefish, bullheads, catfish, mullet, spot, Spanish mackerel, crabs, oysters, and shrimp.

5. Gulf States--Fresh and processed fish and shellfish--red snapper, crabs, oysters, and shrimp.

6. Great Lakes States--Fresh fish--carp, chubs, cisco, lake herring, lake trout, sheepshead, sucker mullet, whitefish, yellow perch, and yellow pike.

7. Pacific States[6]--Fresh and processed fish and shellfish--salmon, sardines (pilchards), mackerel, tuna, rockfish, flounder, halibut, lingcod, sablefish, smelt, crabs, and oysters.

The major part of the fish caught in the United States and Alaska has been utilized as food, from 60 to 70 percent of the total catch. The amount destined

Table 2 - Index numbers of average monthly retail prices of specified foods in leading cities[1] and average monthly retail price for canned salmon in the United States, 1939-47
(1935-39 average = 100)

Year	Fresh & frozen fish	Red salmon	Pink salmon	Meats	Dairy products	Eggs
	Index No.	¢ per lb.	¢ per lb.	Index No.	Index No.	Index No.
1947.....	243.4	2/	42.4	214.7	186.2	200.8
1946.....	240.6	44.03/	25.33/	150.8	165.1	168.8
1945.....	220.4	40.4	23.3	118.0	133.9	164.4
1944.....	209.6	42.0	23.5	117.9	133.6	153.0
1943.....	209.0	41.3	23.5	124.2	134.6	161.9
1942.....	160.0	39.8	21.6	122.5	125.4	136.5
1941.....	119.2	30.4	17.9	106.5	112.0	112.2
1940.....	106.7	25.7	15.6	94.4	101.4	93.8
1939.....	99.8	23.6	13.1	96.6	95.9	91.0

1/ 51 cities covered prior to February 1943, 56 cities thereafter. Data from Bureau of Labor Statistics, Department of Labor.
2/ June was the last month in 1947 for which retail price information was collected. The 6-month average is 60.4 cents per pound.
3/ 11-month average price.

for human consumption has been almost equally divided between canned fish, and fresh and frozen fish. The quantity of fish that has been utilized as cured fish has been declining slightly. During the 18-year period, cured fish represented from about 2 to 3 percent of the total catch except from 1930 to 1933 when it ran slightly higher.

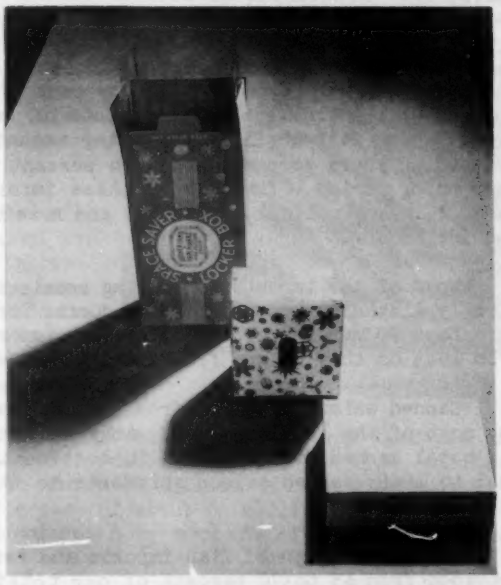
6/ Excluding Alaska.

The over-all estimates on the quantity of fish utilized fresh and frozen, fail to reflect an important internal shift--specifically the year to year increase in the quantity of fish frozen for human consumption. The amount of frozen fish produced in recent years represents more fish (round weight basis) than in the past because of the increasing quantity of fish fillets frozen. For some species the fillet represents as little as 25 to 30 percent of the weight of the unprocessed fish (round weight basis).

The most important canned fish items produced in the continental United States are salmon, sardines (pilchards and Atlantic sea herring) and tuna. From 1930 to 1946 more sardines (pilchards) were canned than any other single species of fish. In 1947, the leading fish canned were tuna and tuna-like fish.

Stocks

On an edible weight basis, the quantity of frozen fish reported held in commercial cold-storage facilities on January 1 each year has ranged from about 8 to 10 percent of the quantity of the previous year's catch utilized in the form of fresh and frozen fish. The estimated January 1 cold-storage holdings in 1933 and 1934 were about 7 percent of the corresponding preceding year's output and the beginning stocks of 1947 and 1948 were 13 and 11.5 percent, respectively. In view of the seasonally low catch in the late fall and winter seasons, frozen fish stocks are highest at the end of the year.



TYPES OF CONTAINERS USED FOR PACKING AND FREEZING PRE-COOKED FISH PRODUCTS

During the war period, cold-storage space became increasingly difficult to obtain. Military agencies maintained large stocks of foods and other merchandise under refrigerated storage conditions thus limiting the space available for civilian use. As of September 2, 1944, War Food Order 111 placed a ceiling on the quantity of frozen packaged fish that could be held in commercial cold-storage facilities. This regulation was terminated in 1946.

Adequate information on canned fish stocks is not available for any one of the 18 years covered in the analysis. However, since 1942, carryover stocks at most distribution levels have been unusually small and their absence from the analysis has had very little, if any, effect on the adequacy of the estimates of civilian consumption of canned fish.

Data on cold-storage stocks of cured fish not subject to reprocessing first became available as of January 15, 1941. They include smoked fish only. In view of the relatively small quantity of cured fish consumed in the continental United States, stocks maintained in commercial cold-storage facilities have been relatively unimportant.

Imports and Receipts from Alaska

Receipts of fish from Alaska and foreign countries have been an important part of the corresponding annual supplies in continental United States. From 1930 to 1939, imports and receipts from United States territories, principally Alaska, were from 30 to 40 percent of domestic supplies. Following the outbreak of World War II in Europe in 1939, imports from European countries were drastically reduced, and, after 1941, imports from Asia virtually ceased. Since 1940, receipts from Alaska and other producing areas outside the United States have ranged from 25 to 28 percent of continental United States supplies.

Canada and Newfoundland have always been the largest suppliers of fish to the United States. Since 1939, they have become more important. Trade with Iceland, a large supplier of cured fish, diminished during the war. However, since 1945, in addition to the cured product, this country has increased its shipments of frozen fish fillets. Japan was a principal source for frozen and canned tuna and canned crab meat before the war, but since that time receipts of fish from Japan have been insignificant.

Imports of fresh and frozen fish have been increasing since 1934. Prior to the war, they were from 10 to 14 percent of the corresponding annual supplies of this country. From 1941 on, receipts of fresh and frozen fish from abroad increased each year until, in 1945, they amounted to almost 16 percent and in both succeeding years were more than 16 percent of the domestic supplies in the corresponding period. The bulk of these imports is comprised of groundfish (cod, haddock, hake, pollock, and cusk) and rosefish fillets from Canada, Newfoundland, and Iceland.

Most of the imports (including receipts from United States territories, principally Alaska) are canned fish products. During the period 1930-42, they accounted for about 70 percent of the total fish imports into the continental United States. From 1943 on they ranged from about 45 to 60 percent of total imports.

Canned salmon receipts from Alaska have always been significantly large. For most of the 18-year period, they accounted for 75 to more than 86 percent of the total canned fish receipts in continental United States. During the period 1941 to 1945, canned salmon shipments to this country ranged from 93 to almost 97 percent.

Until 1940, canned fish imports and receipts from United States territories provided from 45 to 70 percent of our total canned fish supplies. After that time, receipts from these sources ranged from 30 to 43 percent of total domestic supplies. Another indication of the significance of imports is the fact that prior to 1939, except for 1930 and 1935, receipts from abroad, including those from Alaska, exceeded domestic production of canned fish; in 1932, imports were 2½ times the quantity produced in this country. Since 1939, except for 1946 when the canned salmon output in Alaska was unusually low, imports ranged from 50 to 75 percent of domestic production.

Cured fish imports since 1930 have been a very important supplement to the domestic production of this commodity. For the 18-year period, receipts from Alaska and foreign sources were nearly equal to the quantity produced in the continental United States.

From 1942 to 1947, the quantity of canned fish and salted cod and related species imported into the United States from foreign producing areas was limited

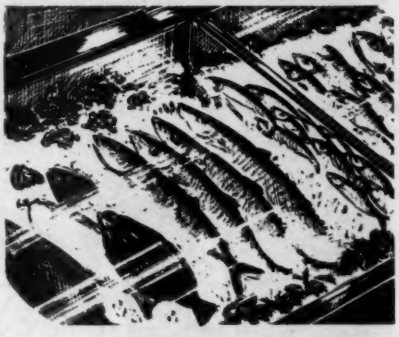
in accordance with the allocation recommendations of the Combined Food Board and the International Emergency Food Council of FAO.1/ Under the provisions of War Food Order 72, in effect from August 1943 to October 1946, these recommendations were implemented and imports were prorated among domestic importers on the basis of the volume of business they conducted in the past years.

DISTRIBUTION AND PER CAPITA CONSUMPTION

United States fish supplies are distributed through commercial trade channels to civilians and foreign markets, and Government channels to United States military agencies and consumers abroad.

Fresh and Frozen Fish

The per capita consumption of fresh and frozen fish in the United States has risen from a low of 4.2 pounds (edible weight basis) in 1933 to 6.2 pounds in 1947 (see Table 1). The upward trend in consumption is principally the result of the increased consumption of fresh and frozen fish fillets. Before the war, the consumption of fish was concentrated in the coastal areas of the United States. Within the past 10 years, the quantity of fresh and frozen fish fillets consumed in the interior parts of the country has increased.



The development of fresh and frozen fish fillets, products which are convenient for household and institutional use, plus improvements in packaging, transportation, and local storage facilities did much to expand the domestic consumption of fish. The wartime shortage of canned fish and of many other foods stimulated consumer demand for fresh and frozen fish.

Purchases of fresh and frozen fish by United States military agencies increased rapidly after the United States entered World War II. In 1942, military purchases in market centers amounted to about 20 million pounds. They doubled in the year that followed and reached a peak of about 64 million pounds in 1944. Most of the fish was purchased for consumption by members of the armed forces stationed in the United States.

Fresh and frozen fish exports and shipments to United States territories have accounted for only a relatively small part of total fish supplies and they have declined since 1930. From 1936 to 1942, exports and shipments fell off each year.

1/ The Combined Food Board, comprised of representatives of the United States, Canada, and the United Kingdom, functioned as an agency which recommended allocations of, among other commodities, the exportable supplies of canned fish and salted cod and related species of the major producing areas among various countries. In 1946, the Combined Food Board was replaced by the International Emergency Food Council of the Food and Agricultural Organization of UN, and the membership enlarged to include the participating countries of FAO. Allocation recommendations for canned fish were discontinued after March 31, 1947, and for salted fish after June 30, 1947.

Canned Fish

The estimated per capita consumption of canned fish in the United States since 1930 has ranged from a high of 5.8 pounds in 1936 to a low of 1.9 pounds in 1942 (see Table 1). The large wartime demands of United States military agencies and allied countries made heavy inroads on the domestic canned fish supplies, and severely limited the quantity available for civilians.

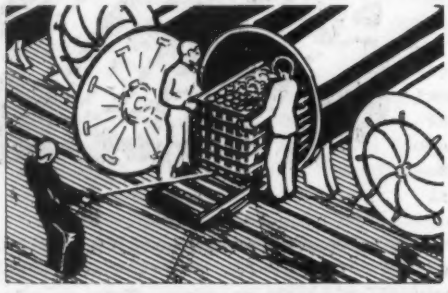
The unusually large wartime demand for canned fish, especially for salmon and sardines (both pilchards and Atlantic sea herring), made it necessary to control distribution. Administratively, this was effected through:

1. Government set-aside orders which required producers to reserve a specific portion of their current canned fish output for Government agencies,

2. Export licenses which permitted only the amount allocated to foreign countries to be shipped out of the United States,

3. The point rationing system which attempted to promote more equitable distribution of civilian supplies of canned fish.

Salmon has been the most popular of the canned fish. It accounted for 50 percent or more of the canned fish consumed in the United States between 1930 and 1940. In 1936, civilian per capita consumption of salmon was almost 3.5 pounds, well over half of the total of all canned fish consumed, 5.8 pounds. From 1942 to 1945, because of large procurement by United States military agencies and the Department of Agriculture, civilian supplies of canned salmon were small relative to demand and consumption per capita declined to about 20 to 30 percent of the total canned fish eaten.



FISH COOKING RETORT

Purchases of canned fish by United States military agencies were increased after the outbreak of the war, from 150 million pounds in 1942 to almost 260 million pounds in 1945. After the cessation of hostilities, military procurement dropped off considerably and in 1946 was at a minimum since there were large military stocks of canned fish to be used up. In 1947, after military stocks had been reduced, procurement again expanded, but to only a fraction of the rates reached during the war years.

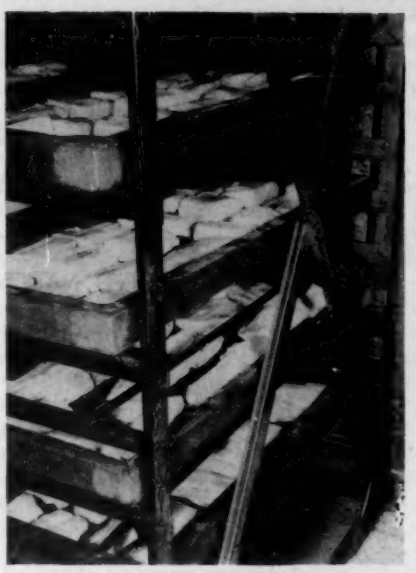
Exports and shipments to territories of canned fish, especially of salmon and sardines (pilchards), have always been fairly sizeable. From 1932 to 1939, exports and shipments ranged from 10 to 16 percent of the total quantity of canned fish moving into distribution channels. After the outbreak of war in Europe, the quantities withdrawn from current market supplies for export under lend-lease to allied countries--principally the United Kingdom, her dependent overseas territories and the British military forces--increased steadily. At their peak, in 1944, they amounted to almost 50 percent of the amount available for distribution.

During and just after the war, most of the exports of food from the United States were handled through the Department of Agriculture. Large purchases of

canned fish were made for lend-lease, the United States territories, UNRRA, and other foreign aid programs. After reaching a total of 181 million pounds in 1944, the Department's purchases declined. Since that time, procurement has been reverting to domestic private trade organizations.

Cured Fish

Consumption of cured fish in the United States has for many years been relatively small. Indicated domestic consumption in 1930, 1.3 pounds per capita, was the highest during the 18-year period covered by this study. Since 1930, civilian consumption has ranged from 0.7 to 1.1 pounds per capita. The relatively low level of cured-fish consumption in this country can, to some extent, be explained by the fact that Americans are not as dependent upon foods preserved by salting or smoking as are many of the citizens of other countries. Abundant supplies of varied foods such as meat, poultry, eggs, dairy products, and fresh and processed fruits and vegetables have been reflected in the general downward trend in the consumption of many food items that are staples in other countries.



SMOKING SALMON CHUNKS ON TRAYS

Military procurement of cured fish throughout the war years, 1942 to 1945, was relatively small. In 1942, military agencies took about 4 percent of the quantity which was available for distribution; in 1945, about 10 percent.

Annual exports and shipments of cured fish from the United States from 1932 to 1942 ranged from 5 to 10 percent of total supplies. After 1939, when fishing operations of European countries were severely restricted as a result of the war, the United States was called upon to increase cured fish exports to allied nations. As a result of this demand, the 1943 and 1944 outward movement of cured fish from the United States accounted for 20 to 25 percent of the domestic cured fish supplies. In the subsequent years, exports and shipments again declined to the prewar volume and reverted to commercial trade channels.

In general, prices of fish have tended to be low in comparison with meat, poultry, eggs, and dairy products. After 1940, the price of fish began to rise rather sharply as did the price of many food items (see Table 2).

APPENDIX

The data on supplies and distribution were converted to an "edible weight" basis using factors developed over a period of years. In general, for the purpose of converting the production estimates to an "edible weight" basis:

(a) canned, cured, and also fresh and frozen packaged fin fish were assumed to be 100 percent edible;

(b) fresh and frozen unpackaged fin fish were assumed to contain no more than 50 percent edible portion; and

(c) among the shellfish, the mollusks catch was assumed to be 100 percent edible because the data are reported on a "meat equivalent" basis, and the crustaceans were converted based on the average meat yield for each species.

For many individual species of fresh or processed fish, separate conversion factors were used depending on both the basis on which production statistics are reported and yield factors obtained both from laboratory tests and from fish processors' experience.

THE UNITED NATIONS AND THE WORLD'S FOOD

Two-thirds of the world's people work every day on the soil, in the forests, or on fishing boats in order that we may all have bread and food, shelter and clothing, according to a statement by the Director-General of the Food and Agriculture Organization to the General Assembly of the United Nations, 28 September 1948. The work of other millions is devoted to preparing these products and bringing them to us, or to making the tools of food production.....

Tomorrow morning there will be 55,000 more persons for breakfast than there were in the world this morning, and the day after tomorrow, 55,000 more, and so on daily--20 to 25 million more people annually.....

Soil erosion--not the removal of nutrients through cropping--accounts for most of the loss of soil fertility caused by man's activity. Millions of acres are destroyed annually by erosion, lowering the production potential of millions more, clouding streams, clogging reservoirs, causing floods. We certainly cannot feed a rising world population from a disappearing resource. On the other hand, soil, water, and forest resources, if properly handled, are renewable and can even be made more fruitful.

I do not mean to neglect the possibilities of further developing the food resources of the seas and inland waters. Exploration and proper development of the production, the processing, the transportation and the utilization of fish foods can add immensely to the protein food supply, which we need particularly. This also can help relieve the pressure upon land for food production. FAO is active in this field. I speak chiefly of the land resources because they are now being pressed most desperately and must therefore be our first concern.

PRELIMINARY STUDY OF TOTAL BACTERIAL PLATE COUNT METHOD FOR FISHERY PRODUCTS

By R. Paul Elliott*

INTRODUCTION

The total bacterial plate count[1] is a valuable test in the study of the spoilage of fishery products. This test is an index of the degree of contamination to which the fish have been subjected, and when used in conjunction with other freshness tests is an index of keeping quality.[2] Counts are especially useful in determining the sources of contamination in a processing line for filleting, canning, salting, etc.

An extensive study of the plate count for fishery products has never been published. Numerous investigators have described the methods they used, but in most cases, their use of a given method was based on limited work. Others have borrowed methods meant for use on other food products such as milk, meat, or water.

The work reported here is a study of methods recommended for or used on fish products by other bacteriologists in the past. There were several variables involved in the plate count method, only one of which could be studied at a time. Thus, sampling, shaking, choice of diluent, pH of the medium, choice of medium, incubation temperature, and incubation time all had to be studied individually yet were all interrelated. Since the choice of a given procedure was based on the treatment which gave the maximum plate count from a given fish sample, a step in the procedure which killed off or inhibited a portion of the flora would affect the results of the study on another step in the procedure. For this reason some portions of the work had to be repeated. A literature survey on the spoilage of fishery products was made in order to avoid such pitfalls. A portion of this survey has been published (Elliott, 1946).

EXPERIMENTAL

Mechanics of Sample Preparation

Preliminary tests showed that blending a fish sample with the Waring-type blender gave more reproducible colony counts than grinding and shaking. Parallel tests showed that there was no significant difference between the coefficients of variation of replicate plates when fresh and spoiled samples were compared. This implied that changes in flora which undoubtedly occurred had no effect on reproducibility.

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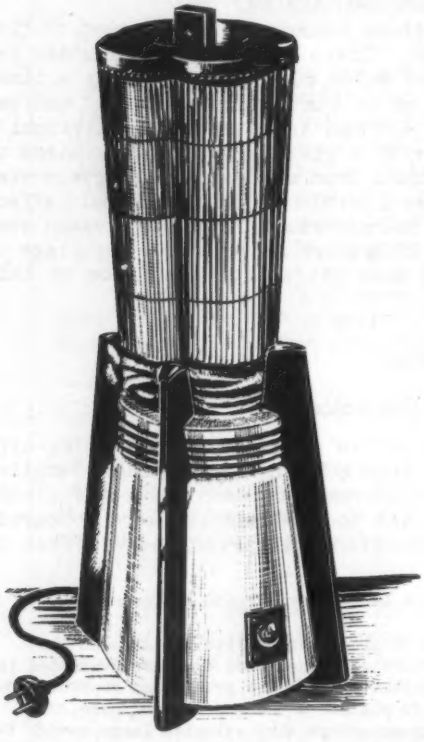
1/ The object of the plate count is to determine the total number of live bacteria in the sample. The bacteria, so small that they are invisible to the naked eye, are suspended in a nutrient "medium" in which all conditions are suitable for their growth and reproduction, and in which they cannot move readily from plate to plate. After a period of time, the individual bacteria so suspended reproduce to such an extent that colonies large enough to be seen form in the medium. Knowing the number of colonies and the extent of dilution of the fish material, it is then an easy matter to calculate the number of live bacteria which were present in the original fish material.

2/ See Griffiths and Stansby (1934), Fitzgerald and Conway (1937), Dyer and Dyer (1947), and Castell (1948).

It was found that most fishery products could be blended adequately only upon the addition of an equal amount of diluent in the blending jar. When less diluent was added to fish, "tunnelling" occurred in the mixing process. While watery flesh did not require as much diluent, an equal amount of diluent was added in such cases in order to standardize the treatment of samples.

While the material was being blended, a distinct rise in temperature occurred. This should be avoided, since marine bacteria are quite sensitive to heat. Zobell and Conn (1940) found that when marine muds were held for 10 minutes at 30° C. (86° F.), 25 percent of the bacteria were killed. In the present case, when 150 grams of fish sample and 150 cc. of diluent were blended for two minutes in the Waring jar 17244, the temperature rose from 22° C. (72° F.) to 30° C. (86° F.). When both fish sample and diluent were chilled to 3° C. (37° F.) in a refrigerator, the blending caused the temperature to rise as follows:

Blending time in minutes		0	1	2	3	4	5	6
Temperature of mixture	Degrees Centigrade	3	9	13	17	21	24	28
	Degrees Fahrenheit	37	48	55	63	70	75	82



BLENDING DEVICE

Thus when the material is chilled adequately, the rise in temperature should offer no difficulty. A three-minute blend of the chilled diluent and sample was adopted in the subsequent studies.

It was found impossible to pipet the 1 to 1 blended sample because it was too thick. Increase in the proportion of diluent resulted in a mixture easy to draw into the pipet, but with this increased amount of diluent, blending caused the whole mass to become a foam containing about 20 percent air. Twenty grams of the blended 1 to 1 dilution were therefore weighed into dilution bottles containing 80 cc. of the diluent. This gave a 1 to 10 dilution. Subsequent dilutions were made by pipetting 10 cc. of suspension to 90 cc. of diluent.

Shaking Time and Settling Time

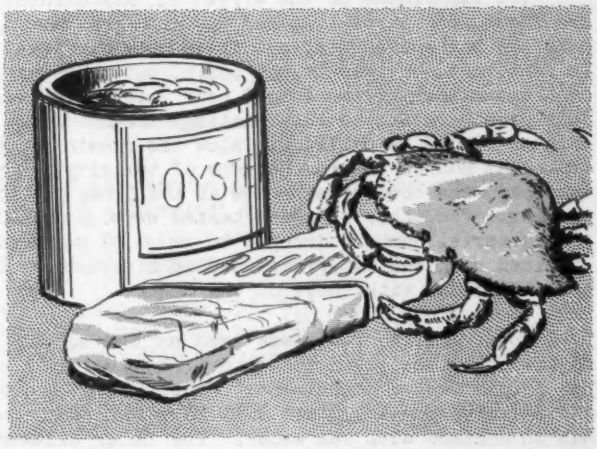
A shaker with a 4 inch stroke, 150 strokes per minute, was used in the experiments. Examination of reproducibility of replicate pipettings revealed that a 2 to 4 minute shaking period was satisfactory. Settling of the material was not a serious difficulty even though the dilutions were not plated immediately, because the supernatant liquid gave the same count as the homogenous mixture. Only after an hour's settling was any inconsistency noted; and even then the material could be mixed sufficiently by shaking it a few seconds by hand.

Diluent

When a diluent is used to dilute a suspension of material so that the concentration of bacteria is in the right range for plating, it is always assumed that the bacteria remain dormant during this time, and that the diluent does not kill any of the organisms in the sample. Since it was thought that this might not always be the case, a study was made of the toxicity of various diluents. Those examined were:

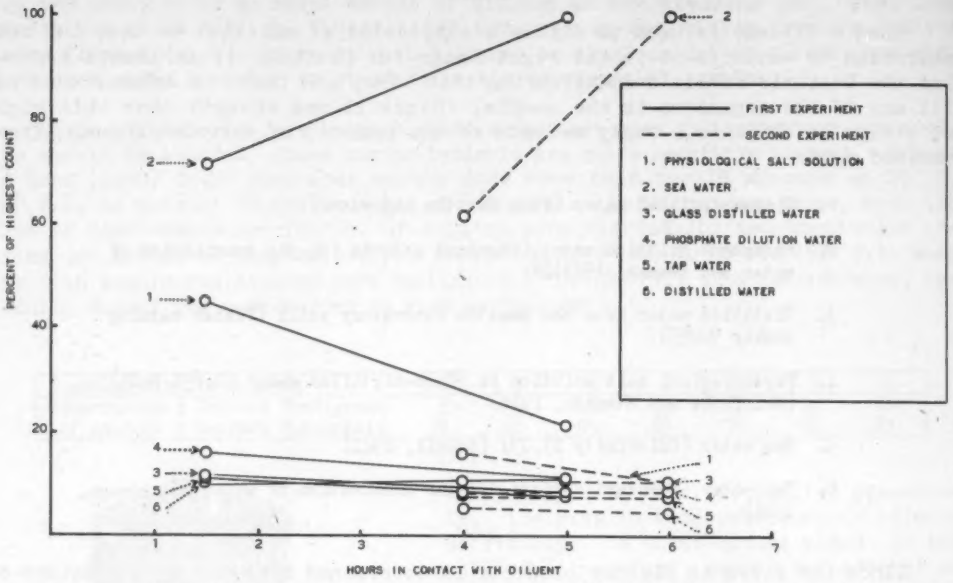
1. Glass-distilled water (from Seattle tap water)
2. Phosphate dilution water (Standard methods for the examination of water and sewage, 1943)3/
3. Distilled water from the Seattle laboratory still (Fisher catalog number 9-055)
4. Physiological salt solution in glass-distilled water (0.85% NaCl) (Griffiths and Stansby, 1934)
5. Sea water (Chlorinity 17.07) (Zobell, 1941)
6. Tap water (Standard methods for the examination of water and sewage, 1943)

Since the flora in fishery products is determined somewhat by the nature of the product (Elliott, 1946), three types of fishery products were used in the evaluation of the diluents. Samples of Pacific oysters (Ostera gigas), meat of the Dungeness crab (Cancer magister) and Pacific rockfish (Sebastodes sp.) were stored at 1° C. (34° F.) in a refrigerator for 8 days. This treatment was used to make certain that the flora present was that responsible for spoilage of the product, because at 8 days, spoilage was incipient. Each sample was blended, and replicate samples were weighed into the respective autoclaved, cooled diluents under study. These suspensions were shaken, and further dilutions were made with the diluents under tests, and then were plated in Difco nutrient agar made up with sea water. After a fixed holding period at room temperature, these suspensions were again plated. Colony counts were made after the plates had been incubated for 5 days at 25° C. (77° F.).



3/ The formula for phosphate dilution water is as follows: Dissolve 34 grams of KH_2PO_4 in about 500 ml. of (glass-) distilled water. Add 1 N. NaOH until a pH of 7.2 is reached. Dilute to 1 liter. Add 1.25 ml. of this stock buffer solution to each liter of aerated, (glass-) distilled water.

FIG. 1 - EFFECT OF VARIOUS DILUENTS ON BACTERIAL PLATE COUNTS ON SPOILING DUNGENESS CRAB MEAT

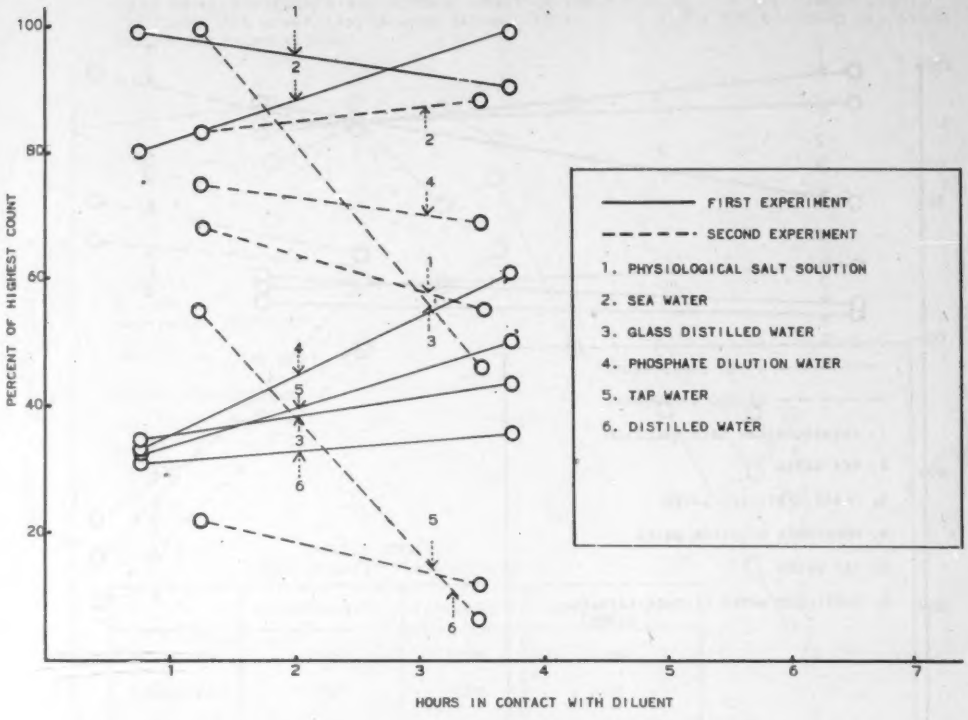


The experiment on the effect of the diluent was performed twice. Results are shown in Figures 1,2, and 3. With crab meat (Figure 1),sea water as a diluent gave the highest counts, and therefore was least toxic of any of the diluents. In fact, not only was it not toxic, but there was apparently growth of a significant amount during the 2 to 3 hour interval between the first and second plating. This growth indicated that platings should be as rapid as possible and that the diluent should be chilled to slow the growth of the bacteria. Other diluents for crab meat showed varying degrees of toxicity. Physiological salt solution showed toxicity, the counts being low at the first plating, and still lower at the second plating. The other diluents tested were distinctly toxic, for in each instance, the bacterial numbers dropped to only 10 percent or 20 percent of the numbers obtained when sea water was used as a diluent. Results on the second experiment were identical with those on the first.

When rockfish flesh was used as the sample (Figure 2), sea water was the choice of diluent,even though physiological salt solution gave equally high counts; for in the second experiment, counts showed a more distinct drop upon prolonged contact with physiological salt solution, while no drop occurred when the sample was in contact with sea water. The other diluents were grouped below these in both experiments. However, in the second experiment,(Seattle) tap water and distilled water from the laboratory still showed more distinct toxicity than was noted in the first experiment.

When oysters were used as the sample (see Figure 3), physiological salt solution and sea water were apparently of equal value, while glass distilled water was a close third. In the repeat experiment on oysters, however, phosphate dilution water was distinctly superior to the other diluents, and sea water and glass distilled water were next in value. This inconsistency between the two experiments makes a choice of diluent for oysters impossible without further work.

FIG. 2 - EFFECT OF VARIOUS DILUENTS ON BACTERIAL PLATE COUNTS ON SPOILING PACIFIC ROCKFISH FLESH



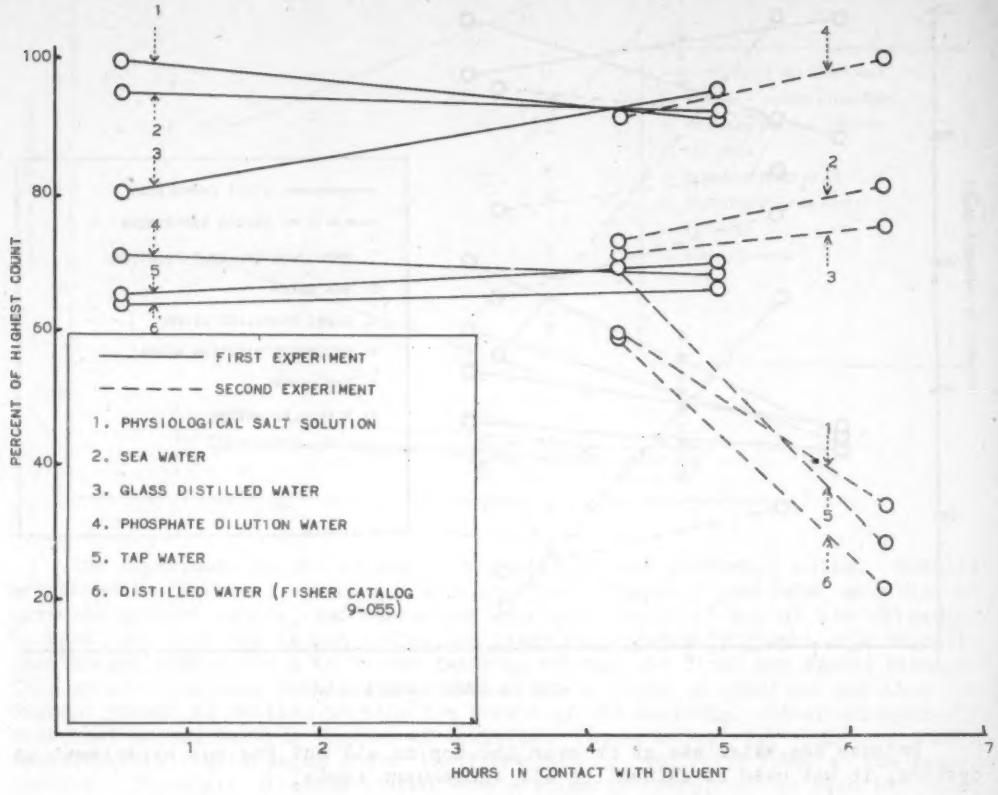
Because sea water was at or near the top in all but the one experiment on oysters, it was used as diluent in all subsequent tests.

pH of the Medium

Zobell (1941) suggested that a medium of pH 7.5 to 7.8 gave optimum conditions for marine bacteria. An experiment was undertaken to determine what effect the pH of the medium might have on the counts on fish products. A series of 10 batches of Zobell's medium number 2216 (Zobell, 1941) was made up, each at a different pH. The pH range of the media after sterilization was from pH 8.0 to 8.53. Suspensions of oysters, crab meat, and rockfish that had been held at 1° C. for 8 days were plated in each medium. In addition, direct microscopic counts were made on the fish suspension by the method described by Tarr (1943).

Results are shown in Figure 4. It is evident that media with pH values of 7.0 or lower were quite satisfactory. However, counts tended to drop markedly in alkaline media. The abruptness of this drop depended on the fishery product plated. When rockfish flesh was used, counts began to decrease at neutrality, but with oysters and crab meat, the drop occurred only when pH 8.0 was reached. It was tentatively concluded that for plate counts on fishery products, the pH of the medium should be neutral or slightly acid.

FIG. 3 - EFFECT OF VARIOUS DILUENTS ON BACTERIAL PLATE COUNTS ON SPOILING PACIFIC OYSTERS

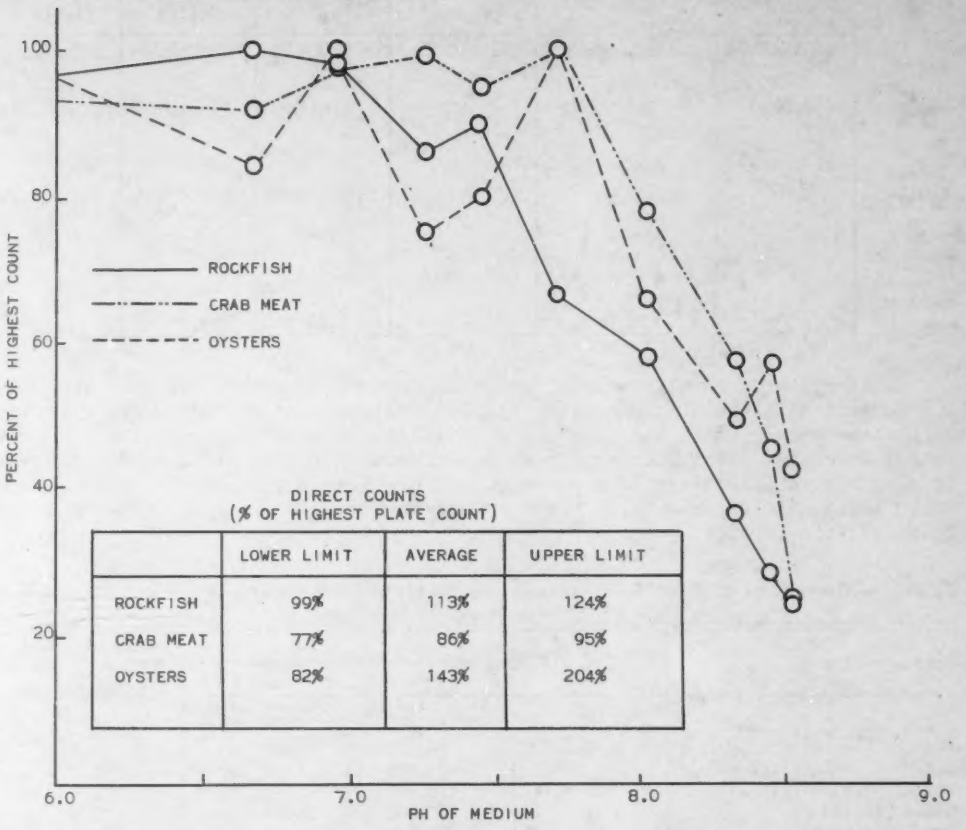


Medium

The work on the medium was essentially an evaluation of the media suggested by other workers. Preliminary work in which Zobell's 2216 medium (1941) was compared with nutrient agar showed that the former medium was distinctly superior. Results are shown in Table 1. Zobell's medium gave counts ranging from 1.03 times to 35 times as high as those obtained with the nutrient agar.

It was noted in the data of Table 1 that Zobell's medium gave a count 2.25 times greater than that on nutrient agar when a fresh sole fillet was plated, and only 1.26 times greater when a spoiled sole fillet was plated. Fresh clams and salmon gills gave even greater differentials. An experiment on the spoilage of sole was conducted in order to determine whether or not this inconsistency meant that Zobell's medium allowed a wide variety of marine forms to grow, but that the true spoilage bacteria grew nearly as readily on ordinary nutrient agar. It is evident on examination of the data in Table 2 that such was not the case, for Zobell's medium gave somewhat lower counts on the fresh sample, but considerably higher counts in all other cases. The low count on the fresh sample with

FIG. 4 - THE EFFECT OF PH OF THE MEDIUM ON TOTAL PLATE COUNTS ON FISHERY PRODUCTS. EACH POINT REPRESENTS THE AVERAGE COUNT ON THREE PLATES. IN THE DIRECT COUNT, THE LOWER AND UPPER LIMITS WERE CALCULATED AS 2 1/2 TIMES THE STANDARD DEVIATION OCCURRING AMONG FIELDS.



DIRECT COUNTS
(% OF HIGHEST PLATE COUNT)

	LOWER LIMIT	AVERAGE	UPPER LIMIT
ROCKFISH	99%	113%	124%
CRAB MEAT	77%	86%	95%
OYSTERS	82%	143%	204%

Zobell's medium in the data of Table 2 was probably an artifact. Zobell's medium 2216 is undoubtedly superior to nutrient agar for plate counts on fish products.

In a second experiment, the media listed in Table 3 were tested simultaneously with suspensions of oyster meat, crab meat, and rockfish flesh which had been held at 1° C. for 1 week. Results are shown in Table 4. There was some inconsistency but results were, in general, fairly uniform. Nutrient agar with 1.5 percent NaCl and nutrient agar prepared with aged[4/] sea water were considered of equally high value for rockfish and crab meat. Zobell's medium 2216 was next in value for these products, and probably quite satisfactory for most needs. Other media were grouped below these in value. Reuszer's (1933) peptone-glucose-phosphate medium was of distinctly inferior quality since it gave the lowest counts, and the colonies were small and difficult to count.

4/ Aging filtered sea water for 2 months in the dark reduces its organic content to a minimum, and thus gives sea water from widely different sources approximately the same composition. Such a treatment was necessary in a study such as this, so that the medium would be of reasonably constant composition. (See Zobell, 1941).

Table 1 - Comparison of Difco Nutrient Agar and Zobell's (1941) Medium 2216 for Plate Counts on Various Fish Products

Medium	Colony Count					
	Fresh live little neck clams	Gills from fresh pink salmon (river caught)	Fresh Pacific oysters	Fresh Dungeness crab meat	Fresh sole fillet	Spoiled sole fillet
	Bacteria/gm.	Bacteria/gm.	Bacteria/gm.	Bacteria/gm.	Bacteria/gm.	Bacteria/gm.
Difco nutrient agar	4,200	905,000	83,500	1,320,000	338,000	740,000,000
#2216 (Zobell, 1941)	147,000	4,150,000	134,500	1,360,000	760,000	930,000,000
Ratio of count on #2216 to count on nutrient	35	4.7	1.6	1.03	2.25	1.26

With oysters, results were slightly different. However, nutrient agar with 1.5 percent NaCl was a good medium. An implication that "fresh water" bacteria might have been present was found in the fact that fish extract agar (mostly fresh water) and Difco nutrient agar (fresh water) were also good media. Nutrient agar in aged sea water and tryptone glucose extract agar were next in value, while other media were grouped below these. Reuszer's medium was again shown to be the least satisfactory.

Table 2 - Comparison of Difco Nutrient Agar and Zobell's (1941) Medium #2216 for Plate Counts on Sole in Various Stages of Spoilage

Odor raw flesh1/	Storage time in ice	Colony Count		Ratio of count on 2216 to count on nutrient agar
		Nutrient agar	Zobell's 2216	
	Days	Bacteria/gm.	Bacteria/gm.	
Fresh (rigor) (fillet 1)...	0	12,000	9,900	0.83
Flat (fillet 2)	7	15,400	18,600	1.2
Slightly stale (fillet 3)..	7	72,000	108,000	1.5
Slightly stale (fillet 4)..	11	1,510,000	2,050,000	1.36
Stale (fillet 5)	11	1,560,000	4,000,000	2.56
Putrid (fillet 6)	17	3,830,000	4,100,000	1.06
Putrid (fillet 7)	17	6,600,000	10,400,000	1.50

1/ Average opinion of 3 to 5 people.

One of the most important decisions which must be made in making a plate count is the proper medium to use. From the first experiment in which Zobell's medium was compared with nutrient agar, it would seem that the former was the obvious choice. However, when in the second experiment these media were compared with several others, Zobell's medium was not the best. Nutrient agar with 1.5 percent NaCl was consistently good for oysters, crab, and fish muscle. However, nutrient agar made up with sea water was in some cases even better, and in all other cases nearly as good. Nutrient agar made up with aged sea water was chosen for the tentative method on the basis of these results. This medium differs from Zobell's medium 2216 only in the substitution of beef extract for ferric phosphate and in the reduction of the pH of the medium to below 7.0. It is probable that Zobell's medium might be equally as good if its pH were reduced to a value below neutrality (see Figure 4 in which the effect of reduction of its pH is shown.)

Table 3 - Media Tested in Parallel to Evaluate Acceptability for Plate Count

No.	References	Formula
1	Gibbons (1934)	Difco nutrient agar plus 1.5% NaCl
2	Newton (1924) Zobell (1941)	Difco nutrient agar made up with sea water aged in glass in the dark 2 months or more
3	Tarr and Bailey (1939) and others	Difco Bacto nutrient agar Beef extract 0.3% Peptone 0.5% Agar 1.5% Glass dist. water
4	Zobell (1941)	#2216 Peptone 0.5% Ferric Phosphate 0.01% Agar 1.5% Sea water aged in glass in the dark 2 months or more
5	Reed and Spence (1929)	Rockfish muscle 500 gm. Peptone 10 gm. Agar 15 gm. Sea water 100 cc. Tap water 900 cc. Infuse fish in water 12 to 15 hours. Boil 10 minutes. Filter. Add other ingredients.
6	Reed and Spence (1929) (modified)	Same as 5 but substitute sea water for tap water
7	Kiser (1944)	Bacto peptone 0.5% Yeast extract 0.2% Ferric phosphate 0.01% Bromthymol blue 0.0015% Sea water (aged)
8	Zobell (1941)	Proteose peptone 0.2% Peptone 0.3% Beef extract 0.2% Agar 1.5% Sea water (aged)
9	Reuszer (1933)	Peptone 0.1% Glucose 0.1% K_2HPO_4 0.005% Agar 1.5% Sea water (aged)
10	Redford (1933)	Gelatin 1.0% Peptone 1.0% Glucose 1.0% NaCl 2.9% K_2HPO_4 0.025% Agar 1.5% Tap water
11	Gibbard, et. al. (1947)	Beef extract 0.3% Tryptone 0.5% Glucose 0.1% NaCl 1.0% Agar 1.5% Glass dist. water

Table 4 - Evaluation of Media Described in Table 3. Media Were Tested in Parallel and Are Listed in Order of Decreasing Count.

Oyster Meat			Crab Meat			Rockfish Flesh		
Medium No.	Average of 4 plates	Range	Medium No.	Average of 4 plates	Range	Medium No.	Average of 4 plates	Range
	Bact./gm.	Bact./gm.		Bact./gm.	Bact./gm.		Bact./gm.	Bact./gm.
1	158	139-170	1	116	92-148	2	204	185-217
5	130	121-141	2	108	99-130	1	197	183-208
3	115	78-171	4	42	28-55	4	183	178-190
2	92	76-109	3	40	33-46	8	173	138-208
11	82	69-100	7	40	21-55	7	159	143-177
8	73	54-96	8	40	23-56	11	155	140-167
6	67	53-92	5	38	31-46	3	145	140-150
4	62	55-71	6	38	30-49	10	142	136-149
7	56	49-72	11	35	30-42	6	138	125-151
10	47	39-50	10	33	24-41	5	131	118-145
9	22	17-25	9	16	14-18	9	111	102-119

Incubation Temperature

Various workers[5/] have shown that in the majority of instances, the temperature of optimum growth for fish spoilage and other marine bacteria lies between

5/ See Bedford (1933), Fellers (1926), Gibbons (1934), Hess (1934), Kiser (1944), Shewan (1942), Shewan (1945), Tarr (1941), Zobell (1941), Zobell and Conn (1940), and Zobell and Upham (1944).

20° C. (68° F.) and 25° C. (77° F.). Regardless of what fishery product has been examined, no one has ever found a bacterium which produces its most rapid rate of growth at a temperature lower than 20° C. Also, only a small proportion of such bacteria will grow at temperatures above 30° C. (86° F.). Shewan (1945)stated that in the slime and gills of fresh fish, only 0.5 percent of the bacteria growing at 20° C. would grow at 37° C.,and that if this percentage increased,such increase indicated that contamination from human sources was high. In fact, Zobell and Conn (1940) found the sensitivity of marine bacteria to high temperatures to be such that plating with the medium at 45° C., which is the accepted temperature at which plates are generally poured, gave only 81 percent to 83 percent as many bacteria as plating at 30° C.

An investigation at this laboratory on the incubation temperature for total bacterial counts in fish products indicates (Table 5) that when spoiling sole is examined, plates incubated at 25° C. give much higher counts than those incubated at 37° C.

Table 5 - Comparison of 25° C. and 37° C. as Incubation Temperature for Plate Counts on Spoiling Sole

Sample number	Time fish were held in ice	Colony Count	
		Plates incubated 4 days at 25° C. (77° F.)	Plates incubated 2 days at 37° C. (99° F.)
	Days	Bacteria/gm.	Bacteria/gm.
A	10	585,000	3,000
	15	7,150,000	2,440
B	5	305,000	34,800
	10	5,700,000	3,000
	12	3,350,000	1,600

In another study, a test was made to determine whether or not temperature of storage during the spoilage period causes a variation in flora which would change the proportion growing at 37° C. as opposed to 25° C. Homogenous samples of rockfish were held at 3° C. and 25° C. Platings were made at intervals during the spoilage period,and replicate plates were incubated at 25° C. and 37° C. Table 6 gives the results of this study. For fish that spoiled at 3° C., plates held 18 days at 3° C. or 5 days at 25° C. gave equally high counts. On the other hand,37° C. was a totally unsatisfactory incubation temperature, because in some instances counts actually fell as spoilage progressed. For fish that spoiled at 25° C., incubation of plates at 25° C. gave the highest count, as would be expected. Plates incubated at 3° C. gave somewhat lower counts, and those incubated at 37° C. also gave low counts, but, as would be expected, not nearly as low as with fish spoiling at 3° C.

In a third study,results exactly parallel to those described above were obtained. In this experiment, however, a sample of rockfish flesh was allowed to spoil at 37° C. as well as at the lower temperatures. It was found that when plates from fish spoiling at the higher temperature were incubated in parallel at 21° C. and 37° C., almost identical counts were obtained at the two temperatures.(See Table 7).

It is concluded from this study of incubation temperature that the temperature at which fish spoil determines to a large extent what types of bacteria predominate in the spoilage. This is indicated by the almost total absence of 37° C. growers in the fish spoiling at 3° C.,by the presence of a fairly large proportion of these

Table 6 - Effect of Plate Incubation Temperature and Spoilage Temperature on Plate Counts of Rockfish Fillets[1/]

Sample	Spoilage Temp.	Storage Time	Plate Count		
			Incubation Temp. 3° C. (37° F.)	Incubation Temp. 25° C. (77° F.)	Incubation Temp. 37° C. (99°F.)
	Degrees C.	Days	Bacteria/gm.	Bacteria/gm.	Bacteria/gm.
A	25	0	1,715,000	1,170,000	148,500
	25	1	535,000,000	790,000,000	235,000,000
B	25	0	52,500	139,500	3,400
	25	1	41,450,000	89,500,000	51,000,000
A	3	0	1,715,000	1,170,000	148,500
	3	1	2,035,000	1,660,000	7,000
	3	2	191,000	1,310,000	14,050
	3	4	8,600,000	8,700,000	116,000
	3	7	53,000,000	56,000,000	38,500
B	3	0	52,500	139,500	3,400
	3	1	220,000	183,500	29,450
	3	2	340,300	324,500	2,000
	3	4	6,450,000	4,400,000	33,500
	3	7	69,000,000	72,000,000	8,000

1/ Samples A and B were homogenous ground mixtures held in sterile beakers at the two different spoilage temperatures after the initial sample was taken for count. The two samples were taken from widely separated fish filleting houses in Seattle.

organisms in the fish spoiling at 25° C., and by the predominance of 37° C. growers in fish spoiling at 37° C. It was further concluded that incubation temperatures of 20° C. to 25° C. are best for plate counts on unprocessed fish, since incubation in this range gave highest counts in all cases.

Table 7 - Effect of Incubation Temperature on Counts for Fish Spoiling at 37° C. (99° F.)

Storage time of fish at 37° C.	Plate Count	
	Incubation temp. 25°C.(70°F.)	Incubation temp. 37°C.(99°F.)
Hours	Bacteria/gm.	Bacteria/gm.
4	40,000	41,700
6	87,300	85,000
8	102,000	103,000
12	1,100,000	1,110,000

The following paragraph appears in Recommended procedure for the bacteriological examination of shellfish and shellfish waters (Gibbard et. al., 1947):

> "A standard colony count of shellfish samples has been found to be of value as an index of general sanitation and refrigeration."

In the method described in that publication, 37° C. is recommended as an incubation temperature. Because 37° C. appeared to be a relatively high temperature of incubation, a single experiment with shellfish was run to determine whether 37° C. or 25° C. gave the higher count. A sample of Pacific oysters which had been obtained freshly shucked at a commercial plant, and then held 8 days in the refrigerator was plated. All plating technics were according to the recommended method described in the above publication, but replicate groups of plates were incubated at 25° C. as well as at 37° C. Results in Table 8 show that plates incubated at 25° C. had 8.2 times as many colonies as those incubated at 37° C. These results indicate that this portion of the standard methods procedure should be investigated further.

Table 8 - Effect of Incubation Temperature on Plate Counts[1] of Pacific Oysters[2]

Incubation temperature		Incubation time	Plate count average of 4 plates
Centigrade degrees	Fahrenheit degrees	days	Bacteria/gm.
25	77	7	82,000,000
37	99	2[3]	10,000,000

1/ Plate counts were made by the standard method described by Gibbard, et. al. (1947).
2/ Oyster meats were stored 1 week at 1° C. (34° F.)
3/ In an earlier experiment it was found that plates incubated at 37° C. for more than two days showed no increase in count up to 7 days at which time the medium had dried out markedly.

Time of Incubation

In order to determine the optimum incubation time for plates incubated at 25° C., one series was removed from the incubator at daily intervals for counting. To prevent contamination at the counting period, the lids of the plates were not removed. The count did not change perceptibly between 3 and 17 days' incubation. However, at 3 days many colonies were very small, which made counting difficult, and after 10 days, colonies often became so large that they fused together. Thus 4 to 7 days was considered best incubation time for bacterial counts on fish, and the 7-day period was preferred for ease of counting.

DISCUSSION

The data presented in this report are of a limited nature. More work must be done before any method for bacterial counts on fish products can be called "standard." The data are presented here merely as a basis for further work.

Shown below is the tentative method which has been developed from a consideration of these data. Because most of the work was done with fish flesh, the method is not necessarily recommended for shellfish.

> To 150 grams of chilled fish flesh or crab meat in a sterile blender jar, add 150 cc. of autoclaved chilled sea water. Blend for 3 minutes. Weigh 20 grams into a tared dilution bottle containing 80 cc. of chilled autoclaved sea water and shake for 3 to 4 minutes, but be certain that all clumps have been broken up. Transfer by pipet to subsequent dilutions in chilled, autoclaved sea water, and shake each dilution 3 to 4 minutes. Plate as promptly as possible, but if plating is delayed more than a few minutes, refrigerate the dilutions to be plated to prevent growth of the micro-organisms, and shake the suspensions slightly before plating. To plate, pipet 1 cc. of the suspension to petri dishes in triplicate and pour Difco nutrient agar made up with aged sea water, and with a pH between 6.0 and 7.0, into the plates and mix. The temperature of the medium should not be above 42° C. at the time of pouring. After the medium has solidified, invert the plates, incubate them 4 to 7 days (preferably 7 days) at 20 to 25° C., and count colonies. (Material of very low count may be weighed directly from the blended mass to the petri dishes without further dilution.)

SUMMARY

This report is a preliminary study of methods for determination of the total bacterial plate count on fishery products.

Blending a fish sample gives better reproducibility than does grinding and shaking. The temperature rise which occurs on blending the sample with the diluent might reduce the number of bacteria unless the sample and diluent are chilled

before being blended. Dilutions should be shaken 3 to 4 minutes. Settling after the shaking period is not a serious problem. Sea water was the most satisfactory diluent found, while many other commonly accepted diluents were distinctly toxic to fish spoilage organisms, some killing off more than 90 percent of the bacteria present. The pH of the medium should fall slightly below neutrality, since alkaline media reduce counts markedly. The choice of medium is difficult, but Difco nutrient agar made up with aged sea water proved satisfactory and is suggested for the tentative method.

Plate incubation should be at 20° C. to 25° C. for 4 to 7 days. It was found that incubation in this temperature range gave higher counts than did 37° C. for fish materials spoiling in the range 1° C. to 25° C. This was true of oysters as well as fish. The 37° C. temperature recommended for plate incubation in the standard plate count for shellfish (Gibbard, et. al., 1947) should be investigated.

The temperature at which fish spoil determines to a large extent what bacteria are present.

A method tentative for determination of the total bacterial plate count in fish flesh is described.

ACKNOWLEDGEMENT

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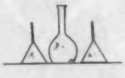


FREEZING FISH AT SEA

One of the first large scale fishing operations involving the freezing of fish at sea was undertaken by a company organized in France with headquarters at Boulogne. This firm operated a fleet of several trawlers in the North Atlantic, North Sea, and Mediterranean. All were of similar size and construction and used the same freezing system, and each had a cold-storage capacity of about 150 tons of round fish. These vessels operated successfully in freezing fish at sea until 1940 when they were seized after France was occupied by the Germans.

--Fishery Leaflet 278

RESEARCH
IN SERVICE LABORATORIES

September 1948

Beaufort, N. C.

During the last week in September, the special shrimp trawling net for testing the new-type shrimp tail bag was completed and used in the ocean waters off Beaufort Inlet. This trawl has an opening of 30 feet between the otter boards and collects the catches of fish and shrimp into either the new-type bag or the large, regular tail bag of 1 inch mesh which surrounds it. When the end of the new-type bag is closed, the fish which escape are caught in the regular tail bag or "test bag" which also operates as the end of a standard trawl net when the new-type net is left open.

In four experimental hauls, a total of 356 pounds of young fish and 8½ pounds of shrimp were collected. These fish consisted of 582 croakers, 440 spot, 54 gray trout, 72 sea mullets, 108 hogfish, 1,656 butterfish, and 1,420 miscellaneous species such as sea robbins, pinfish, spadefish, anchovies, moonfish, lizardfish, etc. In the entire catch of 4,332 fish, a total of 2,912 specimens were young food fish of commercial importance having a length of 4 to 9 inches with the exception of numerous and small butterfish which were 3 to 4 inches long or 40 specimens per pound.

The escapement of young food fish through the new-type tail bag amounted to 1,805 specimens or a weight of 156 pounds. Though many of the butterfish were able to go through the 2-1/2 inch stretched mesh of the new-type net, most of these small fish appear to be too weak to escape. The gray sea trout were of larger size than last fall and only those which were 7-1/2 inches long or less were able to escape. The total catch of shrimp were large specimens of Penaeus setiferus, averaging 25 per pound, all of which were retained by the new-type net.

Boston, Mass.

One trip was made on the Service research vessel, Albatross III, and five lots of trawl-caught fish composed of large and scrod haddock and rosefish were frozen round. When these frozen lots were received at the laboratory, they were defrosted, filleted, packaged, and refrozen for storage and examination.

* * *

Bacteriological examination was made of the lots of frozen fish above for an indication of the particular strains present in the fish holds which may cause early deterioration of commercially-caught fish.

College Park, Md.

Large scale packs of fish sandwich spreads were prepared from pollock, rosefish, and mackerel for actual tests in school lunch rooms. The reactions of the school children to sandwiches made from these packs will be recorded and the data analyzed and used as a guide in preparation of future packs.

* * *

Discussions at a conference of the Vitamin Advisory Committee of the U. S. Pharmaceutical Association, attended by a Service pharmacologist, centered on possible changes in the methods of assaying vitamin A in fish liver oils and concentrates. No decision was reached as to whether or not the present system of evaluation should be revised. Study and comparison of methods will be continued, with the technologists of both the Seattle and College Park laboratories collaborating.

* * *

After 10 months in storage at 0° F., sea trout fillets cut from fresh fish and frozen immediately, and those frozen after being cut from fish which had been frozen and thawed, showed no appreciable differences between lots as based on palatability scores. Although the amount of "drip" upon thawing remained fairly constant during the entire storage period, the quantity obtained from frozen fillets cut from frozen fish that had been thawed was about twice that for frozen fillets cut from fresh fish.

* * *

Frozen Boston mackerel fillets held under various conditions of fluctuating storage temperatures showed no marked changes as judged by palatability scores and amount of "drip" after one month of storage. Lots are being held at constant temperatures of -10° F., 0° F., and +15° F., and at temperatures fluctuating between -10° F. and 0° F., and 0° F. and + 15° F.

Ketchikan, Alaska

A special summer season project of the Fisheries Experimental Commission, an analysis of classified pink salmon cannery trimmings collected in 1946, 1947, and 1948, was completed and a report prepared. The protein, oil, ash, and moisture contents of each of the following parts were determined: heads, collars, fins, tails, livers, eggs, milt, and viscera. The heads contained the highest percentage

of oil--averaging 13.4 percent, and the milt the lowest--1.8 percent. The eggs were by far the richest in protein with approximately 24.8 percent. A special detailed analysis of milt demonstrated that the protein:nitrogen factor for the material should be close to 5.5 rather than the customary 6.25.

* * *

Further studies of the usual biological method for determining the toxicity of shellfish--the mouse test--demonstrated the importance of a precise definition of the term "time of death." The time from the "last normal breath and last coordinated action" to the "last noticeable reflex" may vary from 0 to over 100 seconds. This difference in time averages about 20 to 25 seconds and appears to be independent of the toxicity of the injected solution. The effect of this difference, of course, increases in importance as the total time becomes small, that is, as the toxicity increases. In tests on toxic clam-siphon extracts, the unitage--"last reflex time" relation for the range between 1 and 4 units per ml.--compares very closely with the relation determined by Hermann Sommer using toxic mussel extracts. Above 4 units the relationships may continue to compare closely, but below 1 unit per ml. the old table is not satisfactory.

Seattle, Wash.

In a study of the A. O. A. C. method for determining of fat in fish meal, it was found that improper functioning of extraction equipment often leads to low results. Some equipment siphons solvent at lower rates than others and give reduced precision.

* * *

Work on frozen split rockfish fillets was resumed. Tests were begun to determine the effect of splitting on surface bacterial counts.

CURRIED SHRIMP

1 pound, cooked, cleaned shrimp	1/8 teaspoon pepper
1/4 cup onion, chopped	1 teaspoon curry
3 tablespoons butter or other fat	1/4 teaspoon ginger
3 tablespoons flour	2 cups milk
1 teaspoon salt	3 cups cooked rice

Cut shrimp in half if they are large. Cook the onion in the fat until slightly brown. Blend in the flour and seasoning. Add the milk and cook until thick, stirring constantly. Add shrimp and heat thoroughly. Serve in rice ring. Serves 6.

Additions to the Fleet of U. S. Fishing Vessels

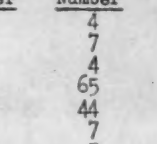
A total of 162 vessels of five net tons and over received their first documents as fishing craft during August--43 more than in the previous month, and 19 more than in August 1947, according to the Bureau of Customs of the Treasury Department. Louisiana led with 31 vessels, followed by California with 27, and Washington with 19. A total of 844 vessels received their first documents as fishing craft during the first eight months of 1948 compared with 925 during the same period in 1947.

Vessels Obtaining Their First Documents as Fishing Craft

Section	August		Eight mos. ending with August		Total
	1948	1947 1/	1948	1947 1/	1947 1/
	Number	Number	Number	Number	Number
New England	7	4	39	38	55
Middle Atlantic	4	7	34	44	64
Chesapeake Bay	7	4	36	54	83
South Atlantic and Gulf	80	65	355	312	486
Pacific Coast	53	44	270	322	415
Great Lakes	4	7	33	30	45
Alaska	7	5	70	101	123
Hawaii	-	7	7	23	28
Puerto Rico	-	-	-	1	1
Total	162	143	844	925	1,300

1/Revised.

Note: Vessels have been assigned to the various sections on the basis of their home port.



Alaska Exploratory Vessel Operates Near Nome

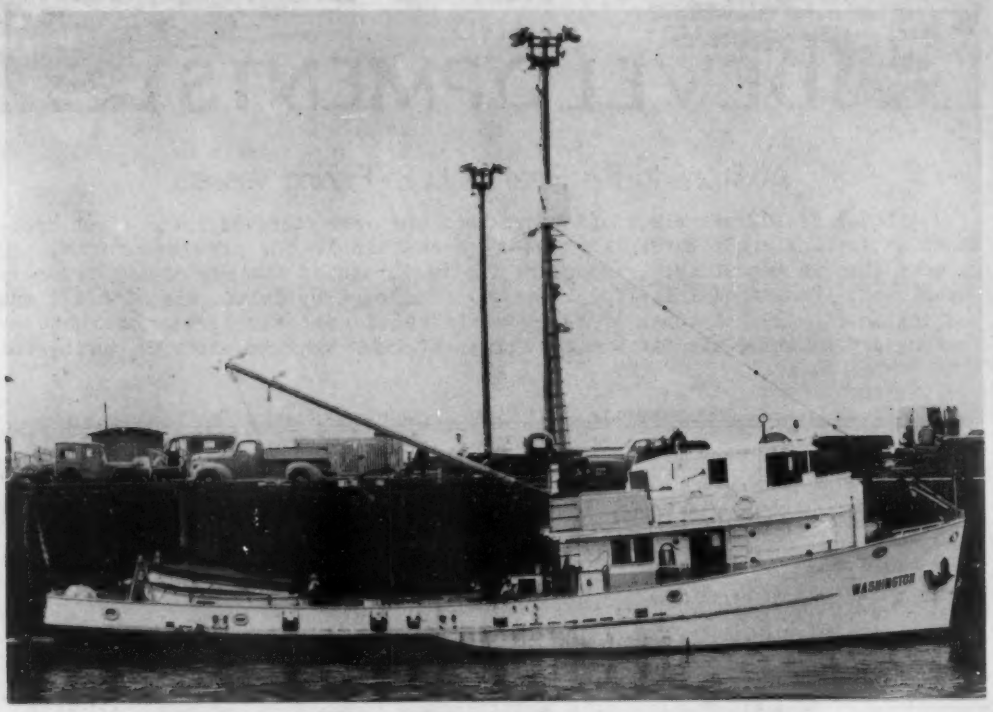
The Alaska exploratory vessel, Washington, which sailed from Seattle, Wash., on August 24 on its first exploratory trip to Alaskan waters, arrived in Nome, Alaska, on September 13. (See Commercial Fisheries Review, September 1948, p. 30.)

Upon leaving Nome, the vessel made several drags in Norton Sound west to the International Date Line and then a series crossing the first, but obtained only very few fish--starry flounder, lemon sole, herring, smelt, two halibut, shrimp, and small female king crabs. The purpose of these drags was to provide a check of the species of fish available in these waters and where they are found at this season of the year.

Then the vessel proceeded to St. Lawrence Island but the weather in that area was so stormy as to prevent further fishing.

It is planned later to do some test dragging on the banks to the south of the Alaska Peninsula and as far east as Kodiak Island. In these latter waters

some work will be done with the vessel's echo-sounder to determine if herring schools can be detected.



ALASKA EXPLORATORY VESSEL WASHINGTON AT THE DOCK IN SEATTLE

In addition, some experiments with freezing fish at sea will be made by the Washington on her present trip. The vessel has equipment for brine freezing at present, and it is planned to add dry-freezing facilities later.

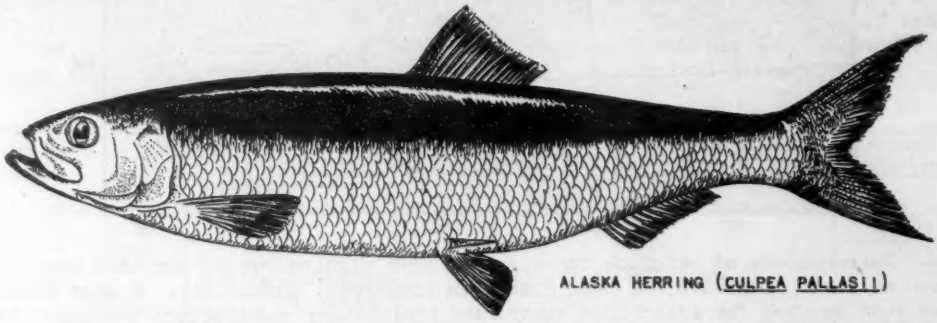
After the return of the vessel to Seattle later in the fall, a series of discussions will be held with industry in order to develop information as to the type of future exploratory work desired.

Alaska Herring Fishery Stabilizing

Following an unhappy decade during the 1930's, the Alaska herring industry is now definitely getting onto solid ground as its supply becomes increasingly abundant. Too much fishing so reduced the number of herring in Southeastern Alaska that by 1939 almost all the companies were forced out of business. To preserve a spawning stock for rebuilding the resource, the Service shut down the fishery during 1940, 1941, and 1942 and has permitted the taking of only predetermined quotas each year since. As a result the supply has improved to where a quota of 400,000 barrels was permitted this year.

The industry has now expanded its activity to the more distant grounds of Prince William Sound and around Kodiak Island. The quota for the former area was 180,000 barrels this year, and 390,000 barrels for the latter.

Quotas are determined in advance of each season by Service biologists. By making scientific studies on the ages and abundance of the different catches of herring each year, they are able to predict with considerable accuracy about how many fish will be available the next season and how many can safely be caught. There are still many things these experts would like to know about herring, but their findings so far have contributed to the stability and prosperity of an industry that was in chaotic condition not many years ago. Besides the amount of fishing, the abundance of herring depends upon factors of nature that, in some years, kill off most of the young. It is by studying the relative numbers of those that live to commercial size that the biologists are able to determine the catch quota.



ALASKA HERRING (CULPEA PALLASII)

A small part of the herring catch is salted, pickled, or smoked as food, but most of it is reduced to oil and meal. They are caught principally by large purse seine boats that move to Alaska during the summer when the pilchard fishery off California is slack.

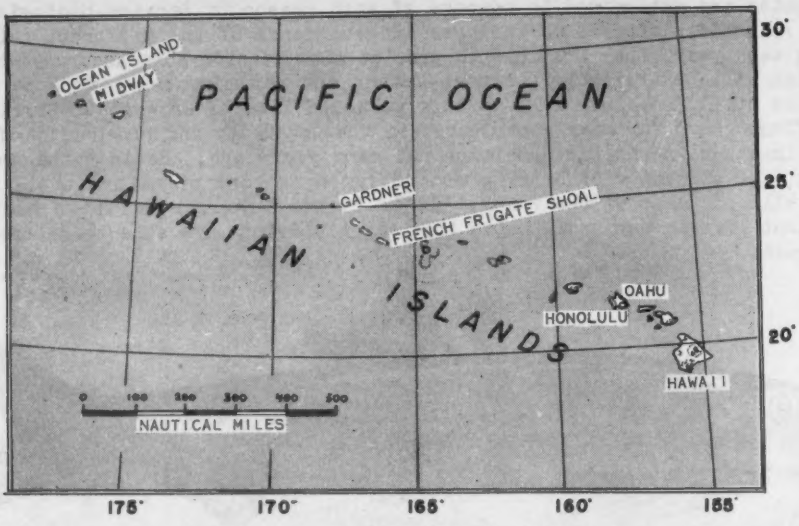
Like any other fish, however, herring sometimes act in a strange and unpredictable manner. Thus, the Service can set a limit on the number of fish that it is safe to take from a conservation standpoint, but it cannot guarantee that the fishermen are always going to catch the limit.

Central Pacific Exploratory Vessels Sight Tuna

The bait boat Oregon and the seiner Alaska, exploratory fishing vessels of the Pacific Exploration Company, were recently fishing in Hawaiian waters.

The Oregon left Honolulu on August 11, and proceeded to French Frigate Shoals, about half way between Oahu and Midway, to look for bait. Along the small sand islands and reefs of these extensive shoals, her crew caught a capacity load of 900 scoops of live bait fish in six days. They were a small silverside known as iao in Hawaii. This load of bait has continued to live well in the Oregon's brine wells and tanks. The iao is evidently a reasonably hardy bait fish, and they behave well when thrown to the tuna. They stick close to the ship, occasionally forming into compact little schools that can be scooped up and thrown out again.

From August 19 to September 5, the Oregon has been scouting for tuna and skipjack along the Hawaiian chain of islands from Gardiner Pinnacle in the northwest to the big island of Hawaii in the southeast.



Fair numbers of skipjack schools have been sighted but so far they have all been wild and they have not been hooked in commercial quantities. A good series has been secured for scientific study, and preliminary examinations indicate that some of the oceanic skipjack have just finished spawning.

The Alaska left Honolulu on July 26 and since then has been prospecting around various islands of the Hawaiian group. Schools of oceanic skipjack and yellowfin tuna have been sighted, but up to about the middle of August no successful sets had been made.

Changes in Railway Express Rates

EXPRESS RATES FOR OYSTERS, CLAMS, AND SCALLOPS INCREASED: The Railway Express Agency on September 9 filed with the Interstate Commerce Commission an increase of 10 percent in railway express rates for shipments of oysters, clams, and scallops from the East Coast to inland cities. The fishing industry had until October 4 to enter protests to this increase which became effective October 13, 1948.

CONTEMPLATED SINGLE NATIONAL SCALE FOR EXPRESS RATES: The change of the present Railway Express Agency's multiple transportation scale to a single national scale under ExParte 163 proceedings, will have no great effect on the fishery industry since scale rates are only applied on a relatively small portion of the fishery products shipped. Testimony on this was filed with the Interstate Commerce Commission on September 10. It is estimated that not more than 25 percent of the fishery products shipments will be affected.

INCREASE IN EXPRESS ICE CHARGES FILED: The Interstate Commerce Commission received on October 5, from the Railway Express Agency, the tariff increasing the charges for ice on shipments of fishery products. The new tariff will become effective November 22, 1948, unless the Commission receives protests and requests for suspension any time within ten days before the effective date.

ECA Procurement Authorizations for Fishery Products

Among the procurement authorizations for commodities and raw materials announced by the Economic Cooperation Administration, fishery products procurement authorizations for October, the leading month to date, totaled $4,120,000. The aggregate authorized since the beginning of the ECA program on April 1, 1948, was $16,703,911, or 31 percent of the total authorized for the 15-month period ending June 30, 1949. However, of this amount, only $228,800 has been authorized to date for the procurement of fishery products in the United States.

ECA Procurement Authorizations for Fishery Products

Product	Country of Origin	Procuring Agency 1/	Recipient Country	Amount Authorized
		October 1948		
Fish, salted	Newfoundland	Italy	Italy	$ 1,473,000
	Canada	"	"	466,000
Total				1,939,000
Fish meal	Angola (Portuguese W. Africa)	U.S.Dept. Army	Bizone Germany	1,381,000
Oil, shark liver	Chile	Chile	France	800,000
Total Approved in October				4,120,000
Total ECA Fishery Products Authorizations, April 1 - October 31, 1948				
Fish, canned	United States	Greece	Greece	128,800
Fish, salted	Newfoundland and Canada	Italy	Italy	4,279,000
Fish meal	Canada, Iceland, Norway & Angola	Denmark, Austria, & U.S.Dept. Army	Denmark, Austria, & Bizone Germany	3,066,361
Oil, herring	Iceland	U.S.Dept. Army	Bizone Germany	1,694,000
" , seal	Newfoundland	France	France	257,600
" , shark liver	Chile	Chile	France	800,000
" , technical fish	United States	U.S.Dept. Army	Bizone Germany	100,000
" , whale	Netherlands, Belgium & Norway	Austria & U.S.Dept. Army	Austria & Bizone Germany	6,378,150
Grand Total Approved				$16,703,911

1/ Where the recipient country is shown as the procuring agency, the government of the participating country or its authorized agents or importers do the purchasing.

Federal Purchases of Fishery Products

DEPARTMENT OF THE ARMY, August 1948: Purchases of fresh and frozen fishery products during August 1948 by the Army Quartermaster Corps for the U. S. Army, Navy, Marine Corps, Air Force, and National Guard for military feeding amounted to 1,662,509 pounds valued at $558,668. The total purchases to date, January through August, totaled 11,100,651 pounds valued at $3,931,998.

Georges Bank Fish Census Almost Completed

The first census of the Georges Bank's fishery resources will be completed on one more voyage of the Albatross III, according to the Service's Branch of Fishery Biology.

By studying the population, size, and the birth and death rates of such valuable commercial fish as haddock, rosefish, herring, cod, and the flounders, the Service hopes to discover how New England fishermen can produce more food from the sea.

Commissioned on March 19 as a Federal marine fishery research vessel, the Albatross III has made nine voyages in the North Atlantic--investigating the stock of fish on New England's fishing banks, measuring hydrographic conditions on the banks which affect fishing, studying the effect of otter trawling on the productivity of the banks, testing improved methods of handling and preserving fish, and working on the selectivity of fishing gear and the design of trawl nets to save small fish.

Four of the voyages have been devoted to a sampling program designed to census the fish of the Georges Bank. Located off the coast of Massachusetts' Cape Cod, the Bank is one of the chief Atlantic commercial fishing grounds.

HAULING BACK THE TRAWL ABOARD THE ALBATROSS III

This census program is the Albatross III's major research project. About 3,200 square miles remain to be sampled of the total 22,000 square miles in the Georges Bank. A subsequent voyage will survey this remaining area.

Before the Albatross III's census work was undertaken on the Georges Bank, the knowledge of the population, size, and the distribution of the fish was scanty and was restricted to the incomplete records of the commercial fishing fleets.

A "random sampling" method, designed to obtain an average, is used in the census work. The Georges Bank is divided into "stations" on which the Albatross III makes its census trawls. When a haul is made, biologists aboard the vessel segregate the fish by species, and count and measure them. Scale samples are taken to determine the ages of the fish, and the stomach contents and sex organs of some specimens are examined. To study migratory habits, fish are tagged and released.

Information is collected on the number, size, and kind of fish taken on each station. It is analyzed at the Fish and Wildlife Service fishery laboratory in Woods Hole, Mass., by statistical methods similar to those used in the popular public opinion polls.

Imports of Fish Nets

The imports of all types of fish nets--cotton, flax, hemp, and manila--have shown a large increase in the first six months of 1948 and larger than imports for all of 1947. Although they are as great as in the prewar years of 1939-1941, there has been a shifting of the countries which shipped the netting. Of the cotton netting, Japan accounted for 93 to 96 percent of the total in the prewar years, while in 1947 and the first half of 1948, Japan was credited with only 15 to 17 percent of this type of netting. The main countries shipping at present are Netherlands, India, and Canada.

The imports of flax (linen) and hemp gill-netting were not large in the prewar years of 1939-1941. Japan was one of the smallest shippers, accounting for not more than 4 percent of the total. Since the war, Netherlands, United Kingdom, Italy, India, and Canada have been the main sources of this type of netting, with none coming from Japan.

In the prewar years, the main shipper of nets, and cod ends made from manila or partly of manila, was the United Kingdom. Japan supplied around 20 percent of these nets in the prewar years with the exception of 1940 when 40 percent of the quantity came from Japan. In 1947 and the first half of 1948, the United Kingdom was still the main shipper while Japan did not ship any.

The following table shows the imports of netting into the United States for the three prewar years, 1939-1941, the first year of the war (1942), last year and the first six months of 1948.

United States Imports of Netting

Year	Cotton Netting		Flax and Hemp Netting		Manila Nets, Including Cod Ends	
	pounds	value ($)	pounds	value ($)	pounds	value ($)
1939	774,563	198,961	49,532	63,198	987,169	181,404
1940	656,336	209,964	13,259	22,607	1,007,722	187,890
1941	433,241	154,330	6,362	9,784	764,101	173,360
1942	26,427	11,652	10,789	17,377	188,315	50,978
1947	21,168	38,816	2,591	5,404	115,098	66,175
1948-6 mos.	83,098	86,473	5,530	10,572	312,564	186,856

Market Development Section to Concentrate on School Lunches

More fishery products in the lunches of many American school children should result from a newly-adopted program for the Market Development Section of the Service's Branch of Commercial Fisheries.

School lunch work was selected as the subject for concentrated attention after a meeting of field fishery marketing specialists in Washington, D. C., during the week of September 20. It was recognized that school lunches offer a promising field for increasing markets for fishery products, and that the present period of relatively high prices for meats is a most opportune time to initiate such a program.

Most food habits are formed during the school years. By making it possible for children to eat fish and shellfish during this strategic period, the Fish and

Wildlife Service expects to stimulate greater use of the products of our fisheries and add variety to the diet of the nation.

Activities will be centered in states where factors of cooperation, economics, and supply are the most favorable. Tentative selection of working areas is being made with the help of the school lunch specialists of the U. S. Department of Agriculture and the State departments of education.

Heretofore, fishery products have not been employed extensively in school lunches, and in many areas are almost entirely omitted from the menus. This situation reportedly is due to a lack of knowledge by school lunch personnel of the mechanics of buying, handling, preparing, and serving fish and shellfish. Also contributing are difficulties in locating supplies of the right species, form, quality, and price. Many schools lack suitable facilities for holding fresh and frozen stocks. To overcome as many of these difficulties as possible, fishery marketing specialists will provide information at effective levels; arrange cooking demonstrations and other group activities; and promote improvement of conditions of supply.

In the pursuit of these objectives, the field staff will participate in various types of meetings conducted for school lunch personnel. At these conferences, they will discuss the values that fishery products can contribute to the diet, and particularly the school child's diet, in terms of added variety, possible economy, content of nutritive elements, and experiences with unaccustomed foods. They will make available to the management of school lunchrooms the resources of the Service in the way of publications and visual aids. Some of this material may be used in interesting the pupils in fishery products while other material is designed to aid in the process of selecting, purchasing, preparing, and serving fish and shellfish. Thus, it is possible to approach the school child from two directions, one through the educational process and the other through the diet.

The experiment in the introduction of these commodities conducted in selected schools in 11 states in the spring of 1948 was a milestone in the development of the use of fishery products in school lunch programs. About 100 schools with some 30,000 students participated in this program. The Department of Agriculture supplied fresh, frozen, and canned fish to these schools without cost. The final results of these experiments have not been published, but from the active participation of the Service in assisting to develop recipes, in training the personnel to handle fish, and in other phases of the project, some knowledge of its course has been gathered. When the final results are available, some of the future work will be based on the findings. Furthermore, it may be possible to follow up the experiment of some of the individual schools so as to capitalize on the 1948 project and to develop, on a small scale, the results that may be anticipated in the project as a whole.

Sealskin Prices Drop at Fall Fur Auction

Although spirited bidding by a good attendance of fur buyers at the annual fall auction held by the Fouke Fur Company in St. Louis on September 27 resulted in the sale of the entire lot of Government-owned fur-seal skins, the average price declined 16.5 percent.

The gross proceeds from the sale of the sealskins amounted to $1,363,503.25 while an additional $1,377 was realized from Pribilof Islands fox pelts. At the last auction, held on April 19, 1948, a total of 29,362 fur-seal skins brought $2,058,787.50 while $2,250 was received from 497 blue fox pelts.

A total of 22,964 dressed, dyed, machined and finished fur-seal skins from the Pribilof Islands were offered by the Government at the September 27 auction through its agent, the Fouke Fur Company of St. Louis. The average price for the entire offering was $59.38; at the spring auction it was $70.10. The average at the October 1947 auction was $57.92.

KENCHING SEALSKINS, ST. PAUL ISLAND, ALASKA. SKINS ARE SALTED AND PLACED IN BINS FOR TEN DAYS OR LONGER, THEN ROLLED FUR SIDE OUT IN BUNDLES, PACKED IN BARRELS, AND SHIPPED TO ST. LOUIS FOR DRESSING, DYEING, AND SALE AT PUBLIC AUCTION.

Of the skins sold, 13,314 were dyed matara brown, 7,574 were safari brown, and 2,076 were black. The average for all matara finished skins was $63.24, a decline of 17.9 percent. Safaris averaged $55.35, down 17.9 percent; blacks averaged $49.28, an advance of 7 percent. The average for blue fox was $3.81, a decline of 15.9 percent.

The South African Government's Cape of Good Hope skins averaged $31.19, an advance of 4.8 percent. Sealskins sold for the account of other shippers averaged $27.98, an advance of 15.3 percent.

Service Biologist to Study Fur-seals in Japan

In order to study Japanese scientific records on the migration and food habits of fur-seals and to investigate the fur-seal herd in Japanese waters, a Service wildlife research biologist flew to Japan from Washington, D. C. on October 4.

The biologist will be attached to the Fisheries Division of the Natural Resources Section, General Headquarters, Supreme Commander for the Allied Powers, in Tokyo, and will remain in Japan for about two years.

In October 1941, Japan abrogated the North Pacific Fur-Seal Convention of 1911. The killing of seals while they are in the sea (pelagic sealing) was prohibited by this international agreement, signed by the United States, Japan, Russia, and Great Britain. Uncontrolled pelagic sealing had threatened the North Pacific fur-seal herds with extinction.

Under the terms of the 1911 Convention, Japan had been entitled to 15 percent of the proceeds of the sale of skins taken on the United States-owned Pribilof

Islands. Payments under this provision amounted to about $1,500,000. The United States, in return, had received 10 percent of the fur-skins taken from the small herd on Japanese-owned Robben Island in the south Okhotsk Sea.

In abrogating the international agreement, Japan declared that a portion of the huge Pribilof herd was proceeding down the Japanese coast and destroying valuable food fishes during its winter migration.

Investigations conducted by the U. S. Bureau of Fisheries at the beginning of the century showed that the Pribilof herd did not mingle with Asiatic fur-seal herds. The Pribilof herd migrated from the eastern portion of the Bering Sea as far south as California, according to the investigations, and confined its winter migrations to the American side of the Pacific Ocean.

Studies of stomach contents by U. S. biologists showed that the fur-seals subsisted largely on squid, pollock, seal fish, and other species not used commercially in the United States.

WRINGING EXCESS SEA WATER FROM FRESHLY BLUBBERED SKINS, ST. PAUL ISLAND, ALASKA.

The Department of State recommended that U. S. scientific data on the migration and food habits of the Pribilof fur-seals be brought up to date as a basis for future international negotiations on the protection of fur-seal resources.

At the end of World War II, the Service began a study of the migratory route of the fur-seals from the time they leave the Pribilof Islands in the fall until they return in the spring, to learn definitely whether there are points of concentration during the course of migration and whether any of the animals that frequent the North American coast cross the Pacific to the Asiatic side. Cruises by the Black Douglas, a Service research vessel, have not as yet reported significant findings.

During the 1930's, two Japanese research vessels conducted wide investigations in the Bering Sea. As a result of these and other studies, the Fish and Wildlife Service believes that Japan has accumulated some thorough biological information on the North Pacific fur-seal herds.

SCAP's Fisheries Division, in Tokyo, has located and assembled confidential records on the fur-seal investigations in Japanese universities, government research stations, and libraries.

The biologist will check the authenticity of this scientific data. He will also conduct field investigations in Japanese waters to study the food habits of fur-seals inhabiting Japanese waters.

South Pacific Commission

The Department of State announced that the three United States Commissioners in the South Pacific Commission arrived at Washington on September 15, to confer with officers of this Government.

The South Pacific Commission was established May 1948 as a regional advisory and consultative body on social and economic matters to the Governments of Australia, France, the Netherlands, New Zealand, the United Kingdom, and the United States. The territorial scope of the Commission comprises all those non-self-governing territories in the Pacific Ocean which are administered by these participating Governments and which lie wholly or in part south of the Equator and east from and including Netherlands New Guinea.

The Commission, like its prototype, the Caribbean Commission, is designed to encourage and to strengthen international cooperation in advancing the economic and social rights and welfare of the inhabitants of the territories within its scope.

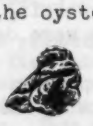
The Commission will be concerned primarily with subjects which are of every day concern in the lives of the people, particularly agriculture, communications, transport, fisheries, forestry, industry, labor, marketing, production, trade and finance, public works, education, health, housing, and social welfare.

Although the Commission does not have an organic connection with the United Nations, it will cooperate as fully as possible with the United Nations and its specialized agencies.

Study of Louisiana and Mississippi Oyster Areas

A preliminary study of the oyster producing areas of Louisiana and Mississippi, which were damaged during the 1945 floods, has been made by Dr. Philip Butler, a biologist of the Service. He has outlined a summary of present conditions and a plan of research to carry out the program authorized last spring by the 80th Congress which appropriated funds for the study of the damage caused by the overflow of the Mississippi through the Bon Carre Spillway.

Dr. Butler will make his headquarters at Pensacola, Fla., and the program will include a critical analysis of the oyster bottoms and studies of the continuing mortality of oysters.



Survey of European Markets for American Fishery Products

On August 20, Arthur M. Sandberg, Fishery Marketing Specialist in the Service's Branch of Commercial Fisheries, left the United States on a two-month survey of marketing conditions in Europe for the Office of Foreign Agricultural Relations under the Department of Agriculture's Research and Marketing Program, to determine current and future possibilities for export of United States fishery products. He will survey markets in France, England, Ireland, Belgium, the Netherlands, Germany, Switzerland, Austria, Italy, and Greece.

Before leaving for Europe, he visited production and distribution centers to become acquainted with the interests and needs of producers and exporters and the availability of products for export. (See Commercial Fisheries Review, September 1948, page 33.) Producers of all areas expressed interest in European markets; the consumer acceptance of their products or of similar products in those countries; the probable demand for new products; information on preferences in labels; fish names most acceptable to the markets; sizes, weights, and packs preferred; and import restrictions in the areas covered.

In general, producers of brands and items which are standard in the American market, are currently having few marketing problems. Most of these producers recognized, however, that despite ample domestic demand, they should try to channel enough of their products through customary European trade outlets to retain their position on these markets. Many firms, some of which enlarged their plants during the war to handle increased production, anticipate more difficulty in the future in selling to the domestic market.

Producers most interested in developing foreign trade, according to his study, are the canners of lower-priced products such as rockfish, pollock, mussels, and whiting, for which there is not as yet an extensive demand. It was felt that many of these products offer comparatively good values in terms of food weight per dollar. In general, these products could be produced in larger quantity if larger markets for them could be developed.

All interested parties recognized the problem of exchange and hoped there would be some means for European countries to finance shipments. Several cited difficulties in obtaining import permits on products shipped recently. It was considered that the survey might help, directly or indirectly, to solve such problems.

With 20,000 cases of canned sardines shipped to Europe last year and large quantities of government-purchased stocks consumed in Europe during the war, New England canners feel it important for the United States to try to make permanent customers of the people who have learned to like American products. With no distress stocks available, these canners said they could supply sardines, sea herring, mackerel, pollock and pollock flakes, hake flakes, whiting, bluefin tuna, and mussels. Items such as sea herring, pollock, mussels, and whiting, that lack as yet a well-developed domestic demand, can be packed in increasing quantities if foreign demand justifies and foreign specifications can be met.

New England producers of fresh and frozen fish said that considerable quantities of lower-priced fish--pollock, whiting, rosefish, mackerel, and scup--could be frozen if foreign demand for them were developed.

In the Middle Atlantic States, packers estimated they could can up to a million cases of herring and whiting, mostly the latter, if commitments were available.

California packers of pilchards, tuna, and mackerel said a marketing program should be undertaken for Europe and that they would be willing to direct portions of their packs to Europe to retain markets where their products were well-known. Several expressed an opinion that a special pack of anchovies could be prepared for export. Available for export from this area are anchovies, squid, pilchards, herring, rockfish, mackerel, and tuna.

In the Pacific Northwest, salmon and pilchard canners and mild-cured salmon producers expressed a desire to retain European markets. Retention of the United

Kingdom market for canned salmon and the Swedish market for mild-cured salmon was causing concern. Northwestern canners reported they would be glad to supply canned salmon, halibut tails, shad, tuna, and rockfish for export.

The canning season for several important products, including salmon, tuna, and California and Maine sardines was not sufficiently advanced to justify prophesies of pack totals. Packers, therefore, were unable to give accurate estimates of canned fish stocks that would be available for export.

U. S. Army and Air Force Canned Fish Requirements

The following are the latest requirements of the U. S. Army and Air Force to be procured from the 1948 canned fish pack, as announced by the Army Quartermaster Corps late in October:

Type of Canned Fish	Dozens No. 1 Cans
Salmon	879,000
Sardines	483,000
Tuna	529,000
Total	1,891,000

Work of FAO, 1947-1948

Work of FAO, 1947-1948[1/] summarizes the work of the Food and Agriculture Organization since the Third Conference held in Geneva from August 25 to September 11, 1947. Mention is made of the fisheries meeting at Baguio where an agreement was drawn up for an Indo-Pacific Fisheries Council, the taking over in part by FAO of UNRRA's rehabilitation and development work in fisheries in China, and the dispatching of two fisheries experts to Siam.

FISHERIES

The work conducted by the Fisheries Division in 1947-48 is described as follows:

> Much of the work relating to fisheries in 1947-48 has been concerned with the initiation of regular statistical and other services, and with the setting up of regional fisheries councils, which will decentralize many of the activities in this field.
>
> A number of special studies and projects have been undertaken. During the year, a report on the salted fish industry from 1920 to date was completed. This reviews the effects of the economic crisis of the early 1930's and the failure of the industry to recover until it received the artificial stimulation of the war. Data are presented looking toward reducing the vulnerability of this industry in the future. A similar study of the herring industry, which has also faced long-standing difficulties, has now been started. Work has been initiated on the development of an international code of quality standards for certain fisheries products entering into international trade.
>
> A study of the fish resources of the world is under way, not only covering the highly exploited areas, but pointing out areas that are little exploited or entirely unknown. A descriptive international catalogue of

1/May be obtained for $1.00 from the Food and Agriculture Organization, Longfellow Building, Washington, D. C. by requesting C 48/10.

educational and research institutions in fisheries and a directory of fisheries scientists are in preparation. In statistical reporting, descriptions of methods used by various countries are being compiled as a first step in bringing about greater uniformity.

Two members of the staff of the Fisheries Division, one located in Europe and the other in the East, have given consultative service to the fisheries administrators.

The Yearbook of Fisheries Statistics and the Fisheries Bulletin are discussed as well as the possibility of distributing, in some form, abstracts of literature relating to fisheries.

FUNCTIONS OF FISHERIES DIVISION

The functions of the Fisheries Division are as follows: Acts as technical adviser to the Director-General regarding fish and fisheries and assists him in carrying out the relevant recommendations of the Council and Conference.

Its primary responsibility includes:

1. The development and maximum utilization in perpetuity of living aquatic resources.
2. Technical problems of fishing and handling fisheries products.
3. Production, marketing, and consumption of fisheries products.

PROPOSED PROGRAM OF FISHERIES DIVISION

The proposed Program of Work for the Division is divided into three types of activity:

GENERAL AND REGULAR ACTIVITIES: Administration: Services to the Conference, the Council and its committees, technical bodies, and international organizations; ad hoc advisory services as requested.

Yearbook of Fisheries Statistics: A biennial publication containing statistics on landings and trade, and miscellaneous statistics on the fisheries industry such as labor, craft and gear, utilization and capacity of processing facilities.

Fisheries Bulletin: A monthly publication which is largely statistical in nature but which contains summary comments on the state of fisheries in various countries as well as short articles of topical interest.

Fishing Methods: Development of information on existing methods and maintenance of a consulting service in this field for member governments.

Fish Resources: Estimation of present known fisheries resources of the world; development of information on resources now little known or unknown, with a view to their fullest possible wise utilization.

Quality Standards: Continuation of work on development of codes for certain fish products entering into international trade.

Statistical Standards: Maintenance of a consulting service for member governments on statistical methods adapted to fisheries and fisheries products.

Fisheries Technological Abstracts: Continuation of a project to collect, publish, and distribute in translation some of the most widely useful abstracts in fisheries technology and engineering.

Fish Cultural Methods: Continuation of work of assembling information on all branches of fish culture and providing a consulting service for member governments.

Catalogue of Fisheries Institutes: Continuation of work of compiling a catalogue of educational and research institutes in this field.

SPECIAL PROJECTS: Commodity Studies: Continuation of work of collecting data and analyzing economic conditions relating to certain important fish commodities that have been subject to chronic market difficulties. Herring will be the product studied in 1949.

Special Bibliographies.

LOCAL ACTIVITIES: Preparation for and Servicing of Regional Fisheries Councils: The secretariat of the proposed Indo-Pacific Fisheries Council and the others under consideration will be furnished by FAO, and much of FAO's regional work in fisheries will be done through the councils. Preliminary work will be carried out in 1949 looking toward the establishment of councils for the European and Latin-American regions.

Regional Liaison and Missions for Europe, the Indo-Pacific Region, and Latin America: In addition to work carried out through the Fisheries Councils, FAO fisheries officers in the regions will be in constant contact with national fisheries administrators, will supply information, and will generally furnish the services available from the organization.

Conferences and Meetings: Conference for inauguration of Indo-Pacific Fisheries Council; conference to consider the establishment of a regional fisheries council for Latin America; conference to consider the establishment of a regional fisheries council for the Mediterranean; meeting of Standing Advisory Committee on Fisheries; meeting of study group for preparation of commodity study on herring; meeting of study group in connection with preparation of material for publication on quality standards; working party to prepare material on statistical standards; special technical conferences on request to deal with regional problems as they arise.

Finally, technical committees and fisheries publications are listed.

The State of Food and Agriculture, 1948

The State of Food and Agriculture, 1948,[1/] was prepared by the Food and Agriculture Organization at the request of member governments as a basic document for the intergovernmental consultations on plans and programs at the Fourth Session of the FAO Conference in November in Washington but is also addressed to the general public.

The report contains a chapter on fisheries products as well as a tabulation of the per capita consumption of fishery products in European countries, Australia, New Zealand, Canada, and the United States in the chapters covering those regions. Whaling statistics are in the section covering fats and oils, as well as in the chapter on fisheries products.

1/May be obtained for $2.00 from the Food and Agriculture Organization, Longfellow Building, Washington, D. C., by requesting C 48/8.

The latter chapter introduces its discussion of Recent Developments by Regions, World-wide Trade Trends, and Whaling, with the following paragraph:

> The shortage of land-produced food during and after the war has turned increasing attention to the sea and inland waters as sources of protein food. There is an awakening of interest in both the western and eastern nations in the latent possibilities of the fisheries. Relatively high prices have increased the extent of fishing activity. A similar influence has been exerted by the development of methods for the detection of fish in the sea, such as the use of sonic depth sounders, and by the use of improved gear, often of new pattern. In countries where fishing is mechanized, the higher fisheries earnings of recent years have resulted in the building of vessels with greater cruising radious. This development, which recently has been coupled with the development of fast refrigerated carrier vessels and factory ships, is extending the areas of effective fishing operations. Largely because of exchange difficulties and other problems of reconstruction and rehabilitation, much of the trade in fisheries products is still controlled by governments. Various kinds of special stimuli for fishing, fish-processing, and trade are still in existence.

The chapter concludes with the following outlook:

> Present signs point to a higher world level of fisheries production and a more complete utilization of the catches than has existed. It is probable that in the absence of relatively adverse economic conditions the trend towards mechanization and expansion which is evident in some countries will spread to others.
>
> Increase in production, if it occurs, will not so much be due to the increased productivity of certain areas which were not fished during the war, but rather to the increased fishing effort in areas that were little used in the past--for example, the western and central Pacific Ocean and the waters adjacent to Latin America. The increased interest in fish farming and pond culture will tend to further increase total production. Nations also recognize that, in exploiting the resources of the sea, sources of food can be tapped without any encroachment upon the living space of man himself, and that no husbandry is necessary, which in itself is an incentive in the face of expanding populations.
>
> There is already evidence of competition in fishing, between nations, in waters of the high seas that have not been subject to sovereign rule or regulation. Governments are turning their attention to the protection of their interests in these areas. In some cases, this takes the form of the assertion of an exclusive right to regulate fishing of their own and other nationals in waters of the high seas contiguous to their shores.
>
> Many of the resources in these waters may be exhaustible, and it is likely that unregulated competition between nations for them will lead to commercial failure. On the other hand, some of the living resources may not be so affected, and in others the yield might actually be increased by more intensive fishing.

Wholesale and Retail Prices

The wholesale index for all commodities on September 18 continued to increase, while that for all wholesale foods continued to decline, but the decline in all foods was not as great as that recorded for the previous month, according to the Bureau of Labor Statistics, U. S. Department of Labor. Topping the previous post-

war peak of August 7 and 21, the comprehensive index for all commodities advanced by September 18 to 169.4 percent of the 1926 level. The wholesale index for all foods decreased 0.2 percent compared with August 14, 1948, but increased 5.0 percent compared with September 13, 1948.

The wholesale average price of canned pink salmon at Seattle during September was 5.1 percent higher than August and 29.1 percent higher than September 1947. Although the wholesale average price of canned red salmon also increased, it was only 0.7 percent higher than August 1948 and 11.1 percent over September 1947.

Wholesale and Retail Prices

Item	Unit		Percentage change from--	
Wholesale: (1926 = 100)		Sept.18,1948	Aug.14,1948	Sept.13,1947
All commodities	Index No.	169.4	+0.2	+7.6
Foods	do.	189.9	-0.2	+5.0
Fish:		Sept. 1948	Aug. 1948	Sept. 1947
Canned salmon, Seattle:				
Pink, No. 1, Tall	$ per doz. cans	5.848	+5.1	+29.1
Red, No. 1, Tall	do.	6.649	+0.7	+17.7
Cod, cured, large shore, Gloucester, Mass.	$ per 100 lbs.	15.00	+2.7	+11.1
Retail: (1935-39 = 100)		Sept.15,1948	Aug.15,1948	Sept.15,1947
All foods	Index No.	215.2	-0.6	+ 5.7
Fish:				
Fresh, frozen, and canned	do.	314.9	+3.4	+14.2
Fresh and frozen	do.	264.0	+3.8	+ 8.8
Canned salmon:				
Pink	¢ per lb. can	56.3	+2.9	+25.4

Retail food prices followed the wholesale food price trend and continued to decline. The retail food index was 0.6 percent under August 15, 1948, but 5.7 percent over September 15, 1947. However, the fresh, frozen, and canned fish index continued to increase and at a greater rate. Unlike the previous month when the increase was mainly on canned fish, the increase, as of September 15, was approximately equally distributed between fresh, frozen, and canned fish. Due to the tapering off of production in most of the fish production centers at this time of the year, the increase in fresh and frozen fish is usual in September. The average retail price of canned pink salmon also was higher than the previous month.

"THERE IS NOTHING NEW UNDER THE SUN"

In the archives of the Great Grimsby Coal, Salt, and Tanning Company Ltd., there is a copy of a document in Norman-French, dated 1376, which tells of various men of Brightlingsea being in trouble for "using a net with mesh so close that no fish may escape, however small."

FOREIGN

Australia

FISH PRODUCTION, SOUTH AUSTRALIA, FISCAL YEAR 1946-1947: Introduction: The total known production of fish in the State of South Australia amounted to 4,750,000 pounds for the fiscal year 1946-1947, according to a report from the South Australia Fisheries and Game Department. Of this total, 1,700,000 pounds were shipped by rail to Melbourne. Most of the fish in South Australia is caught by hand-lining.

South Australia ranks almost the lowest in productivity among the Australian States with its approximately 5,000,000 pounds total catch of fish. New South Wales leads with 30,000,000 pounds of fish per annum. A half of its catch is taken by a dozen trawlers and about 100 Danish seiners (small trawler-type boats). Victoria ranks second in the Commonwealth with 10,000,000 pounds of netted fish. Tasmania, with only a couple of Danish seiners, but many netters, produces 6,000,000 pounds of fish.

AUSTRALIAN TRAWLER

Pilchards: During the year, a special small-meshed net was purchased in order to test the shallow waters of the State for sardines or pilchards (Sardinia neopilcharda). This species of fish closely resembles the pilchard of the West Coast of the United States.

Large schools of sardines have been sighted in Australian waters during aerial observations and during boat patrols. Small lots of these fish have been captured by dabnet in the Port River and in Coffin Bay and adult fish up to 11 inches in length have been taken. An intensive search for these commercially valuable fish is to be carried out. It is to this species and to tuna and mackerel also, that the Australian Fisheries Department looks for the greatest development in their fisheries.

Frozen Fillets: Plants in the past few years have been gradually erected for filleting fish and sharp-freezing the fillets in order that freight costs could be reduced.

The fillets are packaged in cellophane, each pack being about one inch thick and of 5 pound weight, and then frozen quickly. Eight such packs of solidly frozen slabs of fillets fill the cardboard carton which is then sealed and ready for shipment. From some of these centers--and there are today eleven filleting-freezing plants operating in South Australia--the heavy, dirty, wooden fish boxes of yesteryear have been completely displaced by this hygienic pack.

Varieties Produced: In 1936, whiting was almost the only fish along the major portion of the South Australian coast that could bring reasonable returns to the fishermen. Today whiting are not the only fish worth catching because mullet, gar, ruffs, salmon and snook, which are usually caught commercially only by nets, also give good financial returns to fishermen. But many fishermen still do not realize the importance of these tasty fish. In most localities netting is principally done in winter because not only do the fish come close inshore then, but the crabs and sharks which can do great damage to nets have generally moved away from the shallow waters.

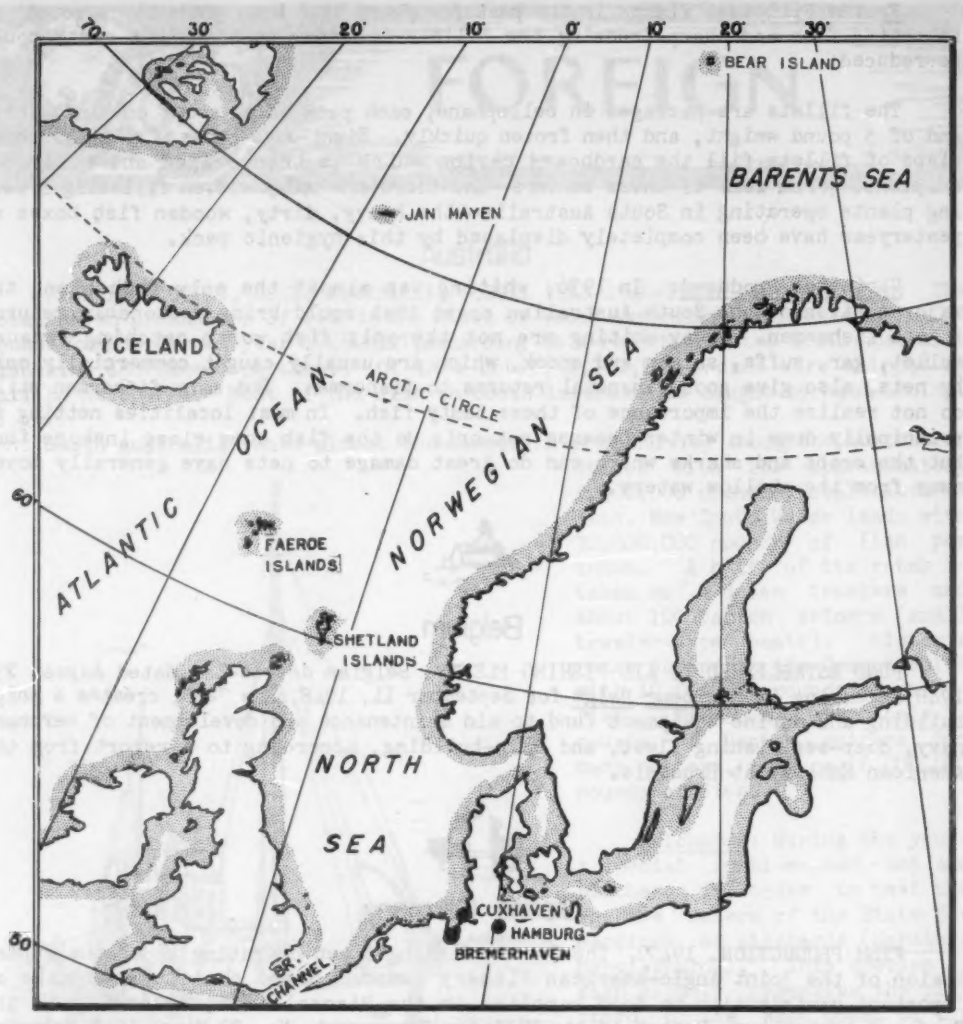
Belgium

FUND ESTABLISHED TO AID FISHING FLEET: Belgian decree-law, dated August 23, 1948, appearing in Moniteur Belge for September 11, 1948, page 7288, creates a ship-building and marine equipment fund to aid maintenance and development of merchant navy, deep-sea fishing fleet, and ship-building, according to a report from the American Embassy at Brussels.

Bizone Germany

FISH PRODUCTION, 1947: The German fishing fleet operating under the supervision of the joint Anglo-American Fishery Control Board continues to make an important contribution to food supplies in the Bizonal Area, according to the Food and Agriculture Report of the Military Government, No. 32, March 1947-February 1948, from the U. S. Office of the Military Government for Germany. Fish are particularly important because of the low animal protein content of the present German diet. Approximately 269,000 metric tons of fish were landed in 1947, providing 251,600 tons of fish for the ration as compared with 232,901 tons for 1946. The remainder consisted of shrimps, mussels, undersized fish, and other types unusually susceptible to spoilage, which are unrationed. The supply of fish was further augmented by imports from the United Kingdom and from Scandinavian countries, amounting to over 113,000 tons valued at over $13,000,000.

The increased catches for 1947 were due mainly to increases in the size of the fishing fleet. During 1947 the operating fleet increased from 142 to 160 deep sea trawlers and from 68 to 84 herring luggers. In addition to the foregoing, there were 425 German-owned coastal cutters and 2,781 small cutters and river boats operating out of coastal fishing villages.



HERRING FISHERY AT PEAK: The German herring industry is now reported to be operating at its highest peak since World War II, according to the American Consulate at Bremen. The season, beginning approximately at the end of May, ends in December. Fishing grounds extend from the Shetland Islands to the British channel according to the movement of the schools of herrings.

During the 1947 season, six companies operated 66 luggers, which landed catches totalling 22,601 metric tons of prepared and salted herring. The present season opened with 72 luggers, which landed 8,996 metric tons from 166 fishing trips up to and including August 18, 1948, as compared with 7,108 metric tons from 134 fishing trips during the corresponding period in 1947. Before the war, the German lugger fishing fleet consisted of 170 ships.

The present annual consumption of herring in the western Zones is estimated at approximately 99,792 metric tons. Experts estimate that the German production will yield 24,948 metric tons, indicating that the German lugger fishing companies are able to fill approximately 25 percent of the demand.

Herring Production (in metric tons)

1947	1946	1945	1938	1937
22,703	20,956	3,074	48,200	67,835

* * * * *

ICELAND FISHING VESSELS IN HAMBURG: Under a special agreement with the Military Government, a number of fishing vessels belonging to Iceland are based in Hamburg, Germany, and operate out of this port in order that their catches may be returned to that city, according to the American Consulate General at Hamburg, Germany. This eliminates transhipment of the fish from Iceland to Hamburg as the entire catch is contracted for by Military Government for the German population.

FISHERY IN GERMAN NORTH SEA PORTS: During the first half of 1948, the total amount of fish landed at North German ports was considerably larger than for this same period last year. Shown in the table is the total quantity of fish available for issuance to the population during the first half of 1948.

Fishery in German North Sea Ports, Jan.-June, 1947-48

Landed at Hamburg, Cuxhaven, and Bremerhaven, by fishing steamers from:	Jan. - June 1948			Jan. - June 1947		
	Trips	Metric Tons	U.S. $	Trips	Metric Tons	U.S. $
North Sea	448	17,274	1,980,600	298	13,698	1,420,200
Iceland	261	24,728	3,130,800	232	25,264	2,361,000
Norwegian Coast	295	38,710	3,851,700	49	5,536	434,700
Barents Sea	29	3,869	298,500	1	190	15,000
Bear Island	19	2,521	196,800	108	13,181	1,049,100
Total landings in smaller ports in Bizone	*	29,307	3,604,500	*	8,118	1,339,500
Total		116,409	13,062,900		65,987	6,619,500

* Not available.

Canada

MANITOBA WINTER FISHING, 1947-48 SEASON: The total catch for the winter fishing season in Manitoba (December 1, 1947 to March 15, 1948) amounted to 17,368,000

Quantities Caught and Values as Landed

Species	Quantity	Value
	lbs.	$
Pickerel (yellow pike)	4,752,800	950,586
Pike (jackfish)	2,434,800	203,582
Sauger	1,789,200	319,301
Suckers (mullet, etc.)	1,988,700	45,725
Tullibee	3,441,400	152,687
Whitefish	2,153,300	248,311
Unclassified	807,800	143,722
Totals	17,368,000	2,063,914

pounds, valued at $2,063,914. Pickerel (yellow pike) was the leading species with 4,752,800 pounds, valued at $950,586, followed by sauger 1,789,200 pounds, valued at $319,301, and whitefish 2,153,300 pounds, valued at $248,311. The marketed wholesale value of the catch was $2,828,870.

Chile

EFFECTIVE DATE OF SOVEREIGNTY OVER CONTINENTAL SHELF LAW CHANGED: The Chilean National Congress on August 18 passed legislation suspending the validity of the "Codigo de Aguas" from its effective date, June 11, 1948, until January 1, 1949, according to a report from the American Embassy at Santiago. The "Codigo de Aguas" included the extending of Chile's sovereignty over the seas adjacent to its coasts to 31 miles offshore. The legislative act of August 18 also restores to legal effect certain provisions of the Civil and Minerals Codes which had been specifically modified by the "Codigo de Aguas" and provides that during the period of the suspension of the "Codigo de Aguas" all laws, orders, regulations and decrees relating to waters, which had been in effect up to June 11, shall continue in full force and effect.

Denmark

MODERN FISH CANNERY OPENED: A Danish firm opened a large fish cannery at Frederikshavn, Jutland, on September 7, 1948, according to a report from the American Embassy at Copenhagen.

The cannery will work primarily on export production and will have a capacity of between 6 to 8 metric tons of fish per day. It will preserve mackerel, sprout sardines, tunny, cod, lobsters and shrimps, and will employ normally about 100 to 120 workers, mostly women, though at full capacity it could employ as many as 140 workers. The area of the plant comprises 12,915 square feet outfitted with very modern machinery and equipment to meet the highest hygienic standards.

Iceland

BUILDING MODERN TRAWLER: The most modern trawler of its type in the Icelandic fleet is now being built in England, according to Fiskets Gang. It will be 165 feet in length, measure 450 tons, and will be powered with a 970 hp. diesel motor. It will have a 13,500 cubic foot fish hold, hydraulic winches, a fish meal plant capable of producing 10 tons of dried meal each 24 hours, and a cod liver oil installation designed to produce up to 20 tons of oil per trip.

* * * * *

SUMMER HERRING SEASON POOR: Iceland's summer herring fisheries, which commenced about July 1, terminated September 11 with a very poor catch, according to

the American Legation at Reykjavik. Engaged in the fisheries along Iceland's northern coasts were 241 vessels employing 235 purse seine nets. These vessels delivered 44,669 metric tons of herring for processing to herring oil plants, and 11,456 metric tons were salted as compared to 124,687 tons and 6,303 tons, respectively, for the corresponding period last year.

To August 28, the production of herring oil was about 4,600 metric tons and herring meal, 4,800 metric tons.

Iceland's essential imports depend almost entirely upon its exports of fish and fish products. Having concluded several trade agreements with European countries, it is unlikely that Iceland will be able to meet the export totals stipulated in these agreements, for they call for shipments of herring oil and herring meal far above the present yield. In fact, this year's catch is the poorest in many years, although more modern boats were engaged in herring fisheries.

It is estimated that the failure of the herring catch will cost Iceland in the vicinity of 15 million dollars in foreign currencies. Consequently, this economic setback will necessitate a reorganization of the import program for the remainder of the year.

TO INCREASE FROZEN FILLETS SALE TO U. S.: Iceland's exports of frozen fillets to some extent depend upon tie-in sales. Iceland undertakes the export of herring oil provided the importing country will purchase frozen fillets. Since exports of herring oil will be considerably smaller than anticipated, Iceland's freezing plants have turned to the preparation of frozen fillets in one-pound cellophane packages, which will be more readily saleable abroad, and have discontinued temporarily the preparation of the standard seven-pound package. Iceland is endeavoring to make greater sales of frozen fillets in the United States, for which she can obtain dollars, though at a loss, to the Icelandic Government which heavily subsidizes its exports of frozen fish fillets.

Italy

NATIONAL FISHERIES CONGRESS: The Italian newspaper, Il Globo, on August 4, published the following information on the National Fisheries Congress which was held at Ancona, according to the American Embassy at Rome:

> Particular attention was given to the possible influence of ERP on the fishing industry. According to the 1947 Paris report, Italian fish production by 1951 should be 210 thousand metric tons (of which 190 in fresh and frozen fish and 20 in preserved fish) or 30,000 metric tons above prewar production.
>
> The fishing industry states that, on the basis of its urgent need for aid, its capacity to produce highest income for the State, absorb maximum manpower, and solve problems of depressed areas, it is entitled to an allocation from the ERP-Lira fund.
>
> It was pointed out that in view of estimated imports of 1.5 million dollars worth of fish during the first semester of ERP aid, it would prove detrimental to the Italian fishing industry if these imports were

to continue in addition to the 60-70 thousand metric tons of cod and stockfish which are normally imported.

A resolution was approved requesting the Ministry of Commerce to include a protective tariff in the revised customs tariffs which are being drawn up, on imported fish produced more cheaply than domestic fish.

The wider use of refrigerators for fish was urged to solve the problem of distribution and to increase consumption.

Members of the Congress visited the National Fisheries Fair and the vast fish market under construction which will be one of the most modern in Europe.

Japan

FISHERIES RESEARCH: The following information on fisheries education and research was prepared for the Food and Agricultural Organization for its 1948 annual report by the Natural Resources Section of the Supreme Commander for the Allied Powers in Japan.

Japan has more personnel, institutions, laboratories, and vessels for aquatic research than any other nation. The problem confronting aquatic research in Japan, therefore, is more efficient use rather than the extension of research facilities. Planning, organization, and coordination are required for the most effective use of these facilities.

Japan has concentrated its research on fisheries production and utilization of aquatic products. Research on fish population management has been comparatively neglected. Japanese fish production methods vary greatly. A few are superior, some are equal to those in the United States, but many are very primitive. Work on fishery technology has been extensive. Certain phases of this work, involving the utilization of fish and fishery by-products, probably are more highly developed than in any other country.

Except for some work on aquiculture, Japanese research in the field of fishery management compares less favorably with other important fish-producing nations. Japan's philosophy has been one of exploitation and continuous expansion. Little work has been done to insure maximum continued production from nearby aquatic areas.

Rivers are largely wasted fishery resources, with production far below the maximum possible. Breeding stocks are insufficient to keep the rivers adequately supplied, and fish are taken long before they reach the most productive size. A limited production is maintained by expensive fish hatchery procedures. Many of Japan's inshore waters where fishing is intensive are overexploited. Little effort has been made to maintain adequate breeding stocks or to protect fish until they reach the most productive size.

In the future, Japan must look to the resources of the Home Islands for its supply of fish. Research must be directed to fish population management if Japan is to obtain a high return from its fishery resources.

Fisheries vocational training, academic education, and research facilities in Japan are closely related to current government reforms. In 1948, the Ministry of Agriculture and Forestry appointed a nine-man committee, the Aquatic Research Reform Committee, to study the problems of research and to recommend ways of unification and better use of research personnel and equipment. The committee consists of six top-ranking Japanese fisheries scientists and three fisheries industry men of high standing.

Reforms Recommended by Reform Committee: The Aquatic Research Reform Committee submitted recommendations recently to the Minister of Agriculture and Forestry. This committee was appointed to make recommendations for the reorganization of Japanese aquatic research. A translation and condensation of the recommendations follows:

FISHERIES RESEARCH REORGANIZATION PLAN

1. Purpose:

In order that the Japanese fisheries research work shall be more effective and efficient, greater coordination between the various phases shall be planned, and better synchronization of the numerous organs involved will be established.

The Fisheries Board is about to be established in the Japanese National Government.1/ Within this reorganization an efficient Research Bureau and several research stations under Government direction are planned so that more efficient research work can be accomplished in order to get more accurate data and better results, to be made available to the fisheries industry and fisheries administration for their guidance and benefit.

2. Outline of Organization:

a. Research Bureau

The Fisheries Research Bureau, within the Fisheries Board deals in general planning and coordination between organizations, summarizes the results of research, and renders technical service to the fishermen and to the fishing industries.

(1) The Research Bureau shall be divided into five sections. Eight stations are to be included in the Bureau as the basis for research work:

(a) Resources Section: pelagic resources--tuna, bonito, whale, etc.
coastal resources--sardine, herring, etc.

(b) Aquiculture Section: marine culture--shellfish, seaweeds, etc.
freshwater culture--freshwater fishes, etc.

(c) Utilization Section: preservation, processing of products, etc.

(d) General Affairs Section: administration, technical service to industries and fishermen, business liaison of research organizations, etc.

(e) Statistics Section: fisheries statistics; survey or actual state of fishing resources and industries.

1/ The Fisheries Board, under the new organization plan, will replace the Bureau of Fisheries.

(f) Research Stations: eight in number. The whole of Japan will be divided into seven geographical regions plus a fresh water region (not divided geographically but regarded as one region equal to any of the other seven regions). Each region has a central experimental station and one or more branch stations. Regional research stations will deal with fisheries problems within their respective regions, and regional research stations will also give technical services to the fishermen of the region along lines indicated by the Research Bureau.

(2) The Research Bureau chief shall appoint national research directors on important problems of intraregional and national scope. The regional research stations shall cooperate with each other under the chief of the Research Bureau.

b. Coordination with research organizations outside of the Research Bureau:

(1) The present prefectural experimental stations shall be the instruments for dispensing technical service to the fishermen of that prefecture, coordinated with the Regional Research Station.

(2) Educational institutions and private organizations shall join in the research work undertaken by the Research Bureau.

c. Committees:

(1) Fisheries Research Committee: A fisheries research committee shall be composed of five distinguished scientists and four experienced industrial men, appointed by the chief of the Fisheries Board to deliberate on items of research, budget, and other important problems, and shall present their opinions to the chief of the Research Bureau.2/

(2) Regional Fisheries Research Committee: Regional fisheries research committees shall be composed of four scientists and five experienced fishermen within those regions, to discuss the regional problems of fisheries research and render technical services to the fishermen.2/

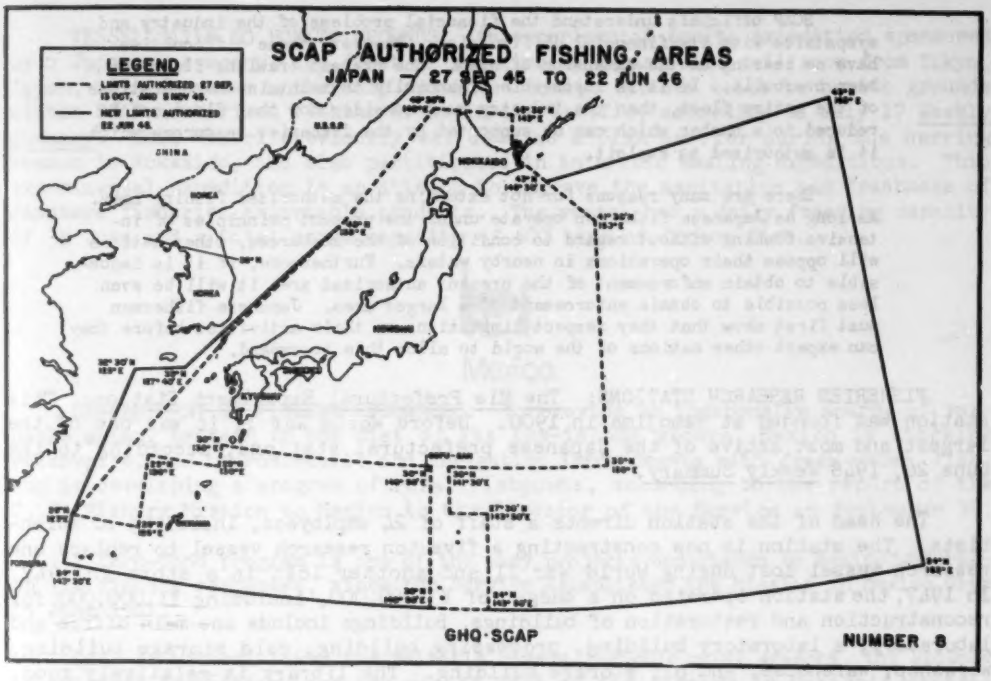
* * * * *

AUTHORIZED FISHING AREA VIOLATIONS PROBLEM: At meetings held by the Trawlers Association at Nagasaki and Simonoseki to devise methods of curbing fishing outside the Japanese authorized area, a representative of the Natural Resources Section indicated the present position and the problems which must be solved, by the Japanese fishing industry, according to the July 4-10 Weekly Summary, of the Natural Resources Section of SCAP.

The SCAP official stated that General MacArthur is very much interested in the condition of the Japanese fishing industry and is particularly concerned about the welfare of the fishermen and the success of fishing operations to help feed the people of Japan. Because of this interest, he has authorized fishing in the present area from which 85 percent of Japan's home island fish production was taken in prewar years. Authorization has been granted for building fishing boats until Japan's present fleet of trawlers and tuna boats is greater in tonnage than that of prewar years. Fuel oil and fishing materials have been made available in increasing quantities to supply the requirements of the fishing fleet. Finally, two Japanese Antarctic whaling expeditions to produce food and oil for feeding the Japanese people have been authorized. As a result of this assistance, the fishing

2/ The term of service of the members of these two committees shall be six years, one third of the committee men changing every two years.

industry has almost entirely recovered from wartime difficulties. The fishing industry has still many problems, but, in general, it is in better condition than any other industry in Japan.



The SCAP official further pointed out that, in the trawl fishery, many boats were fishing outside the authorized area. Since the violations have increased in numbers, the following alternatives and warning were presented:

1. The Japanese Government has been instructed by the Supreme Commander to enforce SCAPIN 1033. The government must immediately work out with the fishing industry a program which will effectively enforce observance of the authorized area.

2. If this cannot be done, then it will be necessary to:

   a. Reduce the area to a size which can be enforced.

   b. Reduce the number of the boats to a level which can be supported within the authorized area, thus reducing the economic pressure to fish outside the area.

   c. Reduce allotments of fuel oil and fishing materials to the level where it will be unprofitable to fish outside the area.

This is a problem which must be faced by the industry.

The official of SCAP made the following reply to the spokesman for the Japanese fishing industry who indicated that they desired the present fishing area extended:

> The Japanese Government has the responsibility for enforcing the authorized area, therefore measures to be taken by the association should be worked out with, and approved by, the government.

The responsibility of the trawling industry is to maintain the maximum continuous production that can be supplied from the authorized area. It has no responsibility for maintaining production that requires fishing outside the area limitations.

SCAP officials understand the financial problems of the industry and sympathize with its financial difficulties. However, these difficulties have no bearing on the extension of area. The present trawling fleet has been overbuilt. If it is impossible financially to maintain the operations of the entire fleet, then the industry must consider how that fleet can be reduced to a number which can be supported by the fisheries resources which it is authorized to exploit.

There are many reasons for not extending the authorized fishing area. As long as Japanese fishermen operate under the present principles of intensive fishing without regard to condition of the resources, other nations will oppose their operations in nearby waters. Furthermore, if it is impossible to obtain enforcement of the present authorized area it will be even less possible to obtain enforcement of a larger area. Japanese fishermen must first show that they respect limitations on their activities before they can expect other nations of the world to allow them to expand.

FISHERIES RESEARCH STATIONS: The Mie Prefectural Experiment Station: This station was founded at Hamojima in 1900. Before World War II it was one of the largest and most active of the Japanese prefectural stations, according to the June 26, 1948 Weekly Summary.

The head of the station directs a staff of 24 employees, including 10 scientists. The station is now constructing a five-ton research vessel to replace one research vessel lost during World War II and another lost in a storm in 1947. In 1947, the station operated on a budget of ¥3,000,000, including ¥1,000,000 for reconstruction and restoration of buildings. Buildings include one main office and laboratory, a laboratory building, processing building, cold storage building, workshop, warehouse, and oil storage building. The library is relatively good.

Work is divided among four branches: Catch, Aquiculture, Processing, and Investigation.

The Catch Branch is in wireless communication with about 150 offshore tuna and bonito vessels working in pelagic fisheries. The Branch compiles data on locations of fishing grounds, fish movement, catch, temperature, currents; tests dyes for nets and paints for vessels; trains crews, officers, and wireless operators in navigation and oceanography by demonstrations and lectures.

The Aquiculture Branch has improved methods of spat collecting for pearl and edible oysters. It is now testing edible oysters for chemical composition and for methods of improving the quality of oysters in Mie Prefecture.

The Processing Branch conducts cold storage tests and studies methods of improving the manufacture of bonito stick. It has devised a method of processing the juice of bonito, formerly discarded, into soup.

The Investigation Branch is working principally on oceanographic studies of Ago Bay, although it studies other oceanographic problems which may arise in prefectural water.

The Hiroshima Prefecture Fisheries Experimental Station: Owing to the devastation of Hiroshima, the Hiroshima Prefecture Fisheries Experimental Station is in

poor condition. A staff of five scientists and 25 additional employees conducts experiments in seed oyster culture and laver culture. Facilities include one major and two minor buildings, all wood and in poor condition; one 11-ton research vessel; and a library.

VESSEL SAILS TO BONITO GROUNDS: An experimental bonito expedition sponsored by a Japanese company, the first of its kind in Japan, will sail soon from Tokyo, Japan, with Japanese mothership and three bonito catcher boats to bonito grounds within SCAP-authorized fishing areas in the Pacific, according to July 17 Weekly Summary. This vessel previously was used as a fish carrier during the herring season in Hokkaido, and also participated in Antarctic whaling expeditions. This experimental expedition is an attempt to improve the sanitation and freshness of Japanese fisheries exportable products. The vessel has a daily freezing capacity of 35 tons and a total cargo capacity of 500 tons of frozen fish.

Mexico

DEVELOPMENT OF FISHERY RESOURCES: To provide an inexpensive source of valuable animal protein in the diet of its low-income groups, Mexico is stocking reservoirs, and hydroelectric and irrigation impoundments with fresh-water fish, and is developing a program of rural fishponds, according to the report of the U. S. Fishery Mission to Mexico to the Director of the Service on September 30.

A farm-pond program is one of the many projects undertaken by Mexico to develop its fishery resources, since the Service established the Mission in Mexico City in June 1941.

Lack of natural lakes and suitable rivers, periodic rainy seasons, the absence of hatchery facilities, and the use of most of the streams in Mexico's central plateau region for irrigation purposes have blocked the growth of the country's fresh-water fisheries.

Improved production and stocking techniques introduced by the U. S. Fishery Mission have also heavily increased the stocking of trout in inland Mexico's colder waters.

Marine fishery research is receiving attention, too. A marine fishery laboratory has been built at Guaymas. Investigations include tagging experiments on shrimp, and the collection of catch statistics and oceanic data on tides and temperatures taken on Mexico's important fishing grounds. The investigations will show the extent of Mexico's marine fishery resources, and will determine future expansion of the Mexican fishing industry. It is hoped that continuing investigations will be undertaken so that annual assessments of the stock of fish available to commercial fishermen can be made.

There is great mutual interest in Mexico's fishery resources between the United States and the Latin American republic. Many of the marine species common to the United States and to Mexico are migratory between the two countries.

Major Mexican fisheries depend on the United States for a market (75 percent of the Mexican catch is either exported to the United States or is carried in U.S. vessels).

The U. S. Fishery Mission to Mexico is assisting both countries in uncovering facts about the little-known resources of Mexico and is assisting Mexico in training a competent staff of fishery investigators.

Present plans call for the continuation of the Mission for at least two more years. It acts in an advisory capacity to the Directorate-General of Fisheries and Allied Industries in Mexico's Ministry of Marine. Funds and personnel for cooperation with the Mission are supplied by the latter agency. The Fishery Mission is conducted by the Fish and Wildlife Service under the U. S. Government program for cooperation with the American Republics.

* * * * *

FISHING FEES FOR AMERICAN BOATS: The Mexican Diario Oficial of August 30, 1948, carries a decree increasing via La Pesca fees 40 percent effective August 30. Increase is comparable to peso devaluation, hence there is no practical difference in the dollars paid now by the American boats for fishing fees compared to dollars paid prior to devaluation. The decree amends only paragraph six of Article 1 of the Mexican Tariff Act of 1939.

Norway

BILATERAL TRADE AGREEMENTS: An extensive schedule of bilateral trade agreements was announced, some of which in the interim were concluded but not yet signed, including one with Austria, according to a late September report from the American Embassy at Oslo. Austria looks toward receipt of Norwegian frozen fish and herring among other commodities in return for steel, chemicals, textiles, and other items. A supplementary agreement with Sweden scheduled for signature in the near future, provides for additional trade each way. Norway is to export nitrates, industrial cod liver oil, iron and steel, agricultural and other machinery.

Negotiations for the 1949 trade agreement with Russia was tentatively scheduled at Moscow early in November.

HERRING FISHERIES: Winter herring fishing in 1948 was the most successful on record. Weather conditions were ideal and fish were extremely abundant. The 1948 catch surpasses any previous records. The final account showed a total catch of 880,900 metric tons as compared to 531,500 metric tons in 1947 and 382,200 metric tons in 1946.

The following table shows the total catch and utilization of the catch:

Winter Herring Catch and Utilization

Item	1948	1947	1946	1938
		(in metric tons)		
Total Catch	880,900	531,500	382,200	533,800
Utilization:				
Exported fresh	131,000	102,100	56,800	79,200
Salted	127,100	110,800	80,800	29,400
To oil plants	579,800	283,200	208,600	382,000
Canned	19,200	18,400	18,500	11,600
For bait	15,700	10,400	7,900	8,500
Fresh for home market	8,100	6,600	9,500	12,200
Other uses	-	-	-	10,900

The success of the herring fishing must be ascribed not only to the abundance of fish but also to the increased capacity of the fishing fleet, and especially to the fact that the vessels are now equipped with radio-sound equipment and thus in a much better position than previously to locate the herring schools.

Even greater quantities of fish might have been taken were it not for the fact that the marketing facilities and processing plants were unable to handle additional quantities. Herring oil factories operated as late as one month after the end of the fishing season and the fish then being processed were not fresh.

LIGHT APPARATUS USED BY HERRING FISHING BOATS: Norwegian fishermen are using light throwers to attract to the surface schools of herring that otherwise stay too deep.

The apparatus consists of projectors with strong lights, as much as 2000 watts. These projectors are mounted on the vessels and throw light on the surface of the water. The light enables fishermen to operate at night and attract the herring to the surface so that they may be caught by purse seines operated from small boats. The current is furnished from a generator powered by the boat's motor.

One type of 2000 watt - 110 volt searchlight used is mounted on the roof of the pilothouse. Normally, it extends about three feet above the pilothouse, but it may be raised or lowered. The beam of the light can be adjusted to shine in any direction. Likewise, the lamp can be moved in or out from the reflecting mirror to produce an intense narrow beam to reach as far as possible, a broader beam as the vessel approaches, and, finally, a powerful working light. The searchlight is directed and all adjustments of the beam are made from within the pilothouse.

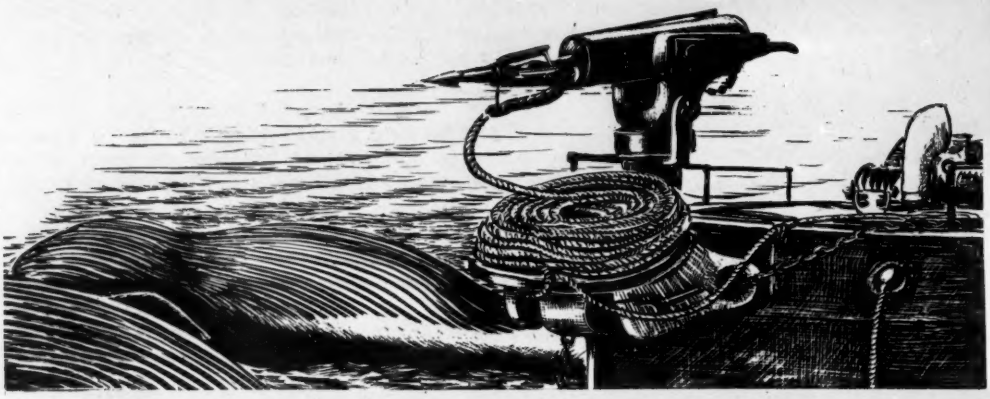
NORWEGIAN SEARCHLIGHT

* * * * *

PREPARES FOR ANTARCTIC WHALING: There is a strenuous activity in southeastern Norwegian whaling ports as the Antarctic whaling fleet--this year, the largest since war's end--prepares to leave for the south polar fields, according to the Royal Norwegian Information Services. With the addition of the new floating factory, Thorshøvdi, the 1948 fleet will be made up of 10 factory ships and 100 whale boats--the approximate size of the prewar fleet. It is estimated that over 6,400 Norwegian whalers and factory workers will be spending the coming season in Antarctic waters.

This year, several Norwegian whaling firms have purchased powerful wartime corvettes which will be used to tow the whales from the catchers to the factory ships--thus increasing the capacity of the fleet. Four of these vessels are being outfitted as whaling auxiliaries.

Using 9 factory ships, Norwegian whalers in 1947-48 caught and processed 935,902 barrels of whale oil and 54,741 barrels of sperm oil. Counting the output of one land station, 1947-48 production totalled 1,046,100 barrels. Due in part to over-age equipment, however, output per ship was somewhat below expectations last year--110,000 barrels against 175,000 barrels for British vessels in the same area. Present estimates indicate that if the 1948-49 catch can reach 1,200,000



barrels with no changes in present oil prices, the coming season may mean $88,000,000 in badly needed foreign exchange. Opening date of the 1948-49 pelagic whaling season, set by international accord, has not yet been announced.

PACKS SEA CRABS: Fishermen in Trondheim, Norway, whose winter fishing catch this year was far from expectations, were unexpectedly blessed with an invasion of sea crabs. This marine delicacy, new to these parts, has provided good raw material for local canneries, and, at present, over 100 men are working night and day to take advantage of the unexpected arrivals. A Norwegian fish cooperative of that city has sold 800,000 quarter cases to a British firm, and sample shipments are also on their way to the United States and Canada.

WHALE MEAT: Enterprising Norwegian whalers have concluded a successful "sea beef" hunt in the North Atlantic. Unlike the larger expeditions which scour Antarctica for whale oil, this smaller experimental group turned northward to Spitzbergen in search of meat for European tables. During a hunting season which began in late May, a refrigerator ship and 12 catching vessels caught and processed over 375 tons of whale beef. The whole of the catch was delivered to England. Success of this year's venture, plus the growing popularity of quick-frozen whale meat, indicates a return expedition next year. It is noted that the expedition was evidently one of those licensed by the Norwegian Government to hunt smaller types of whales in northern waters. Catches of the oil producing variety are strictly regulated by an international agreement.

Republic of Panama

FISH CANNING PLANT PROPOSED: The Government of Panama is studying a proposal recently made by a Danish firm to establish a large fishing and sea food canning concern in the Republic of Panama to supply local and international markets, according to a consular report from the American Embassy at Panama, R. P.

The company reportedly owns modern equipment which has been in use in Europe, including vessels operated by expert tuna fishermen and canning machinery of different types.

A short time ago, a United States firm made a similar proposal, although of smaller proportions, to install a tuna fishing base at the Island of San Miguel in the Pearl Islands.

Republic of the Philippines

FUTURE CANNED FISH EXPORT SEEN: Whether Philippine canned fish can be of a quality suited for export in addition to local consumption, will depend largely on the results of tests on samples of locally canned fish shipped recently to the United States. The shipment is in keeping with the policy of the Philippine Bureau of Fisheries and the U. S. Fish and Wildlife Service to explore the possibilities of exporting Philippine marine products. It is the first such shipment to be made.

Samples sent to the Service's Laboratory in College Park, Maryland, were yellowfin tuna packed in brine, coconut oil, cottonseed oil, and in tomato sauce. Samples of dry shrimp or hibe prepared the native way, of native shrimp packed wet-pack style, samples of native oysters in brine, and gizzard shad (salmon style) were also shipped.

Of the four packing media for tuna, the product in coconut oil is of greatest local interest since it is hoped that it will serve as a substitute for cottonseed oil which is the common medium for tuna packing in the United States. The packing of tuna in tomato sauce is an effort to develop a specialty product that appeals to certain segments of the consuming public.

Since the demand for tuna is limited in the Philippine fresh-fish market, it is thought that the export of this fish would not deprive the Philippine public of any essential food item. Canned tuna is enjoying an increasing popularity in the Philippines and it is hoped that a large local market also can be developed. Furthermore, if successful, canning tuna with coconut oil will be of assistance to the coconut industry in the Philippines.

* * * * *

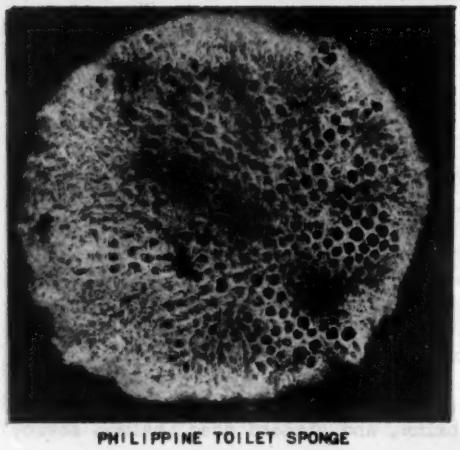
OCEANOGRAPHIC SURVEY OF SOUTHERN PHILIPPINE WATERS COMPLETED: The Spencer F. Baird, research vessel of the Fish and Wildlife Service, Philippine Fishery Program, left Manila the early part of September for the Celebes Sea on a cruise that marks the completion of a year's oceanographic survey of the waters of the Southern Philippines, according to a joint release from the Philippine Fishery Program, and the Philippine Bureau of Fisheries.

Upon the completion of the present voyage there will be available to fisheries scientists more oceanographic data on the Sulu and the Celebes Seas than has ever been collected anywhere in the Western Pacific. This material will be of great aid to the Philippine fisheries.

* * * * *

OPPORTUNITIES IN SPONGE INDUSTRY SEEN: An opportunity for Philippine business capital in the sponge industry was revealed in an announcement on September 10 by the Director of the Philippine Bureau of Fisheries, and the Administrator of the Philippine Fishery Program.

Recent inquiries by the American Sponge Institute, the central trade body of the sponge producers, processors and sellers, indicate that the world's supply of natural sponges is very short and that the price is high. American interests are anxiously seeking new sources of supply.



PHILIPPINE TOILET SPONGE

According to a report of the Philippine Fishery Program, sponges were among the first items for export to come to the attention of the Americans on their advent to the Philippines and they did much to try to promote such trade.

Sponges have been an export item from the Philippines for a long time and records of the industry exist as far back as 1908. In those days, however, sponges were not a particularly lucrative business and the market apparently fluctuated widely. The introduction of plastic absorbent materials about 25 years ago also hindered the development of the industry. Production continued at a small but steady rate throughout the entire American regime in the Islands. Recent technological developments, coupled with the intensive demand for plastic and other sponge substitutes for other uses, has placed new emphasis, apparently, on natural sponges. Also, many American sponge beds have become exhausted by exploitation and the famous Bahama beds have been depleted by disease. The Philippines remain, therefore, one of the few proven sources of supply and all that needs to be done is to get a good quality of sponges on the market.

Recent communications from the United States have asked for specimens of the Philippine product both in the raw state and in the finished condition. The American Sponge Institute is particularly anxious to obtain as complete a collection of sponges as possible to determine the suitability of the product for various purposes for which there exists a demand, and also in order to classify Philippine sponges in terms of the world's trade terminology.

Trieste

TO REBUILD FISHING FLEET WITH ECA FUNDS: Release of 6.4 billion lira of the counterpart funds in Trieste, (equivalent to approximately $11,000,000) for the purpose of financing the rehabilitation and reconstruction of key industries and for the stimulation of productive activity in the US-UK zone of the free territory of Trieste was announced by the Economic Cooperation Administrator on September 24. The counterpart funds require a deposit in local currency by Trieste in an amount equivalent to grants in aid received from ECA.

The funds agreed to be released by ECA will provide local capital for the rebuilding and rehabilitation of existing ship-repair and shipbuilding facilities in Trieste, which has been its mainstay. They will also make possible the reconstruction of the fishing fleet and the development of a canning industry.

Union of South Africa

EXPANSION OF SOUTH AFRICAN FISHERIES: The following tables submitted by the American Consulate General at Capetown gives comparative data showing the recent expansion of the South African fishing industry and supplements the report shown in the July 1948 issue of Commercial Fisheries Review, pages 42-43.

Production of Fishery Products, 1941-1947

Fiscal year:	1946-47	1945-46	1944-45	1943-44	1942-43	1941-42
Item	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Frozen crawfish	2,500,000	1,815,473	434,508	369,620	579,240	1,627,390
Canned "	4,100,000	2,626,984	2,295,408	2,184,603	2,730,532	3,688,618
Other canned fish	*	11,541,038	7,684,052	6,301,969	3,621,894	3,888,933
Smoked & dried fish	*	13,465,820	11,628,748	12,220,451	11,140,627	9,979,914
Fish paste	*	557,653	320,722	401,217	155,565	199,307
Fish meal	4,000,000	4,168,658	2,809,899	3,567,376	-	-
Fish oil	*	997,730	733,183	797,314	778,550	-
Misc. fish products	*	*	*	*	*	*

*Not available.

Value of Fishery Products, 1941-1947

Fiscal year:	1946-47	1945-46	1944-45	1943-44	1942-43	1941-42
Item	U.S. $	U.S. $	U.S. $	U.S. $	U.S. $	U.S. $
Frozen crawfish	*	707,111	103,701	81,904	128,112	249,630
Canned "	*	970,359	699,191	666,554	732,531	905,056
Other canned fish	*	2,871,717	1,990,737	1,460,771	727,321	543,385
Smoked & dried fish	*	1,569,760	1,529,271	1,467,323	1,052,632	761,247
Fish paste	*	254,237	152,736	175,594	69,391	88,054
Fish meal	*	194,655	110,736	128,502	-	-
Fish oil	*	913,653	608,563	622,786	532,389	-
Misc. fish products	*	88,947	130,042	66,219	169,739	324,529

*Not available.

The figures indicate the expansion in the 1945-1947 production of frozen crawfish tails, which is due to increased sales in the United States.

United Kingdom

HERRING OIL PRODUCTION: Production of oil from herring will be undertaken for the first time in Great Britain in the near future, according to the following text quoted from an article appearing in the English newspaper, Manchester Guardian of August 27, 1948, by the American Embassy at London.

> The factory recently erected by the Herring Industry Board at Wick, Caithness, for the production of oil from herring began its trial run yesterday, when a quantity of fish from Ullapool was processed. The first factory of its kind in Britain, it will take herring from ports in the North when the markets cannot absorb them. The oil will be used in the manufacture of food products.

* * * * *

CANNED WHALE MEAT: One-pound cans of whale meat will soon be on sale in Britain, according to The Fishing News of August 21. New Zealand has shipped 2,000 cases and further shipments will follow. The whale meat is cooked at New Zealand's only shore-based whaling station in Marlborough.

NEW FISHERY RESEARCH SHIP: England is building a new fishery research ship, the Ernest Holt, which is to be based at Grimsby when completed, according to the English periodical, The Fishing News of August 28. The whole range of the Arctic fishing grounds are to be studied continuously the whole year round by the vessel. When launched, the research ship will follow two main lines of research during the first two years.

First line of investigation will be the biology of the fisheries, the life cycle and feeding habits of cod and haddock, and the physical conditions of the waters which form their environment, such as temperature and salinity. With a fully equipped laboratory, the results of this work can be used during the cruise. It is hoped that these studies will yield valuable information about the likely distribution of fish at various times of the year.

The second line of research concerns the important commercial problem of improving the quality of fish from distant waters. The new research vessel is being fitted with experimental fish holds equipped with temperature-recording devices, so that new types of insulation and fish hold construction may be tried out.

NYLON TRAWL NETS: The first complete nylon trawl for use by a Grimsby trawler will be ready soon, according to The Fishing News of August 7. The decision to use nylon trawls--only as an experiment at first--follows the successful use of nylon cod ends.

Half-nylon half-sisal trawls are already being made and it is hoped to try them out in three deep-sea vessels.

The high cost of a nylon trawl--about $1,531 as compared with $282 to $322 for a sisal or manila trawl--is expected to be compensated for its longer wearing qualities.

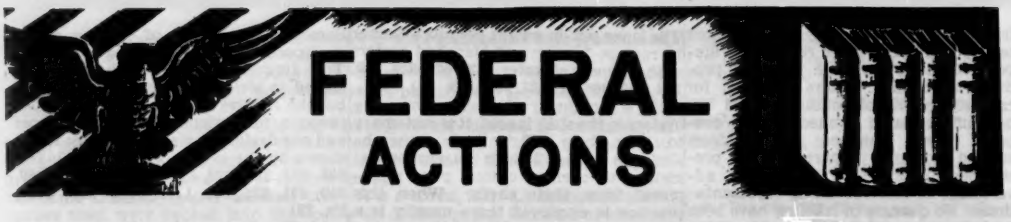
A Hull trawler, experimenting with a nylon trawl, made five successful trips before losing it because of a rough sea bottom.

Deep-sea vessels often wear out one or two sisal or manila trawls on a normal voyage.

U. S. S. R.

RUSSIAN FISHING FLEET IN ATLANTIC: Two Soviet fishing flotillas are operating for the first time in the neutral waters of the North Atlantic during the 1948 Icelandic herring fishing season, according to press reports. The area is regularly fished by British, Norwegian, and Danish fishermen. According to the Soviet press, the Russians expected to reach the fishing area about the middle of July and to remain until the middle of September.

The Russian flotillas consist of 10 fishing boats, equipped with purse seines and drift nets, and two factory ships, the Tungus and the Onega, for preliminary processing of the catch. The fleet was manned by 150 men and 50 women and carried 40,000 herring barrels.



Food and Drug Administration

CANNED OYSTERS--QUALITY AND FILL OF CONTAINER: The Federal Security Administrator on August 3 denied the petition of a West Coast oyster company for a change in the definition and standard of identity and the standard of fill of container for canned oysters established by the Administrator's final order of March 10,1948. The Administrator's supplemental findings of fact, conclusions, and order were published in the Federal Register of August 12, and were based on the recent hearing ordered by the Ninth Circuit Court of Appeals. (See Commercial Fisheries Review, July 1948, p. 45). The previous findings are modified to the extent necessary to take into consideration the "blanching" method of preparing the oysters for canning but make no change in the earlier requirement for fill of container.

Full text of the order, as it appeared in the Federal Register of August 12, 1948, follows:

TITLE 21—FOOD AND DRUGS

Chapter I—Food and Drug Administration, Federal Security Agency

[Docket No. FDC-50]

PART 36—SHELLFISH; DEFINITIONS AND STANDARDS OF IDENTITY; QUALITY AND FILL OF CONTAINER

CANNED OYSTERS

In the matter of establishing definitions and standards of identity and amending the standard of fill of container for canned oysters.

Final order; supplemental findings of fact, conclusions, and order. By virtue of the authority vested in the Federal Security Administrator by the provisions of the Federal Food, Drug, and Cosmetic Act (secs. 401, 701; 52 Stat. 1046, 1055; 21 U. S. C. 341, 371), and on the basis of evidence received at a public hearing held at the direction of the United States Circuit Court of Appeals for the Ninth Circuit beginning on July 7, 1948, the following findings of fact, conclusions, and order are made:

DEFINITIONS AND STANDARDS OF IDENTITY

Findings of fact. 1. Finding 6[1] is modified so that the second sentence shall read: The proportion of oysters to liquid in the finished food depends on the quantity of oysters placed in the container before packing medium is added and on the extent to which such oysters have been precooked by pre-steaming in the shell or blanching after removal from the shell (R. 728, 977).

2. Finding 7 is modified by adding the following at the end thereof:

At the commencement of the 1947–1948 canning season, Willapoint Oysters, Inc., and other canners of Pacific oysters, began the commercial practice of preparing oysters for canning without pre-steaming in the shell.[2] Oysters were purchased as raw shucked oysters or were shucked at the canneries. They were, after washing, immersed in a hot brine solution, the salt content of which ranged from approximately 3 to 10 percent, and blanched in the hot brine for a period from 30 to 60 seconds. After removal from the brine solution, the oysters were washed in fresh water, cooled, and held in warm water until they were ready to be placed in the cans. The cans, after filling with a put-in weight of approximately 7½ oz. of blanched oysters, a salt tablet and water, were sealed and processed by heat, using the regular cannery procedure. When this blanching method of preparation is employed, or when modified methods are used, the treatment of oysters in the boiling brine solution causes the raw oysters to lose water and soluble solids into the brine solution. This loss approximates 16% by weight from the raw oysters. Such loss is not significantly different from the loss which occurs when Pacific oysters are subjected to a light pre-steaming in the shell. After processing in the can, the canned oysters prepared from blanched oysters are practically indistinguishable from those prepared from oysters that have been pre-steamed in the shell, although blanched oysters have a slightly different flavor and the liquid drained from canned oysters that have been prepared for canning by blanching has more fine particles of oyster material in suspension than does similar liquid drained from cans prepared after pre-steaming the oysters in the shell. (R. 713–716, 773, 800, 803, 811–815, 820–826, 829, 844–845, 847–848, 875, 902–906, 1144–1147, Ex. 33)

STANDARD OF FILL OF CONTAINER

Findings of fact. The following findings of fact are made in addition to those forming part of the order previously promulgated (13 F. R. 1337):

9. Pacific oysters prepared for canning by the blanching method are no better than canned Pacific oysters prepared for canning by pre-steaming in the shell. A substantial segment of persons in the industry and large scale purchasers regard them as inferior because of the material suspended in the

[1] This refers to a finding in the order promulgating a definition and standard of identity for canned oysters and amending the standard of fill of container therefor, published in 13 F. R. 1337.

[2] The method used by Willapoint Oysters, Inc., was worked out by Mr. R. H. Bailey, president of the firm, in the kitchen of his home using a pressure cooker and a hand closing machine. He furnished no data as to the maximum fill obtainable, and despite one year's experience with the method, no attempts, experimental or commercial, have been made to increase the fill beyond 5 ounces drained weight. (R. 713, 751, 767–770, 776, 1037–1038)

liquid and because the oysters are more tender and break more readily. Willapoint Oysters, Inc., the principal producer of canned oysters prepared for canning by the blanching method has not differentiated canned oysters prepared from blanched oysters from canned oysters prepared from pre-steamed oysters either by labeling, advertising, or merchandising representations. No changes in labeling have been made by any canners using the blanching method in order to inform purchasers of canned oysters of the method used in preparing their oysters for canning. The same labeling is used for pre-steamed and for blanched oysters. (R. 757, 760, 800, 803, 824, 847–848, 878–882, 1057, Ex. 23, 24, 31)

10. In order to attain a given drained weight of canned oysters, the changes which take place in the oysters during the preparation for and in the canning process must be taken into account. The most significant change is the loss of liquid and the cooking of the oyster meats when oysters are subjected to heat treatment. The total quantity of liquid which separates, based on the weight of raw oysters, is approximately the same whether the oysters are packed into the can raw, given partial cooking in boiling salt water prior to placement in the can (as occurs in the blanching process), or partly cooked in the shell by steaming. (R. 38, 55, 163, 826, 877, 1129, 1143–1144, Ex. 11 (g), 11 (e), Ex. 33)

11. When raw oysters are used to fill the can and no water is added as a packing medium, all of the liquid draining from the oysters because of heat treatment is retained in the can and forms the packing medium. This results in the maximum retention of oyster flavor, but the liquid in the can after processing is quite murky, and this is objectionable to many purchasers. To attain a drained weight of approximately 7 ounces from the No. 1 EO can, it is necessary to put in approximately 11 ounces of raw Pacific oysters. (R. 32, 41, 124, 722–723, 784, 848, 1046)

12. During the blanching process such as described in modified finding 7 under Identity, the raw oysters are partly cooked and lose some liquids. The loss in weight is approximately 16%.[3] As a result of this loss of liquid during blanching, there is less loss in the can during processing than with raw oysters. To attain a drained weight of 7 ounces from the No. 1 EO can, a lesser put-in weight is required than for raw oysters, i. e., about 9½ ounces are necessary with the degree of cooking during the blanching process employed by Willapoint Oysters, Inc. To attain a drained weight of 5 ounces using similarly blanched oysters a put-in weight of only 7½ ounces is necessary. This quantity of blanched oysters does not fill the can. Water is added to the blanched oysters in the can to serve as part of the packing medium; it fills space in the can not filled with oysters. The lower put-in weight permits a canner to replace 2 ounces of blanched oysters with 2 ounces of water. (R. 825–826, 830, 854, 859–866, 869–871, 875, Ex. 33)

13. When the practice of presteaming oysters in the shell is used, it is customary to steam them sufficiently to cause the shells to open. This is an economical method of opening oysters prior to removal from their shells. When this practice is employed there usually is a slightly greater loss of liquid than occurs in blanching. As a result there is slightly less liquid lost in the can during heat processing than with blanched oysters. Using Pacific oysters that have been presteamed enough to cause the shells to open, a put-in weight of about 9 ounces in the No. 1 EO can is needed to give a drained weight of approximately 7 ounces. Canned oysters prepared from presteamed oysters have less of the original oyster flavor than when raw oysters are used, and slightly less oyster flavor than when blanched oysters are used. The difference is more pronounced as between the liquids. It is a common practice for canners of oysters on the Gulf and Atlantic coasts to presteam somewhat more than do canners of Pacific oysters. With heavily presteamed oysters, the meats are cooked more in the shells and are subject to less loss of liquids in the can, in fact, in many instances a put-in weight of around 7½ ounces will yield a drained weight of approximately 7 ounces. Water is added as a packing medium. (R. 718, 824, 829, 847, 978, 1039, 1054, 1062)

14. The put-in weight of oysters, because of variable losses which occur in the can during processing, is not an accurate measure of fill of container for canned oysters. It would be a reasonably accurate measure if all oysters were pre-cooked to the same degree before weighing into the cans. (R. 178, 877, 977, 979, 1062, 1143–1144)

15. The liquid draining from oysters as a result of heating has food value and flavor. But it is of much less value to the consumer than is the meat of the oyster. The liquid drained from canned oysters, except where oysters without any blanching or pre-steaming are used, comes largely from the water added by the canner as packing medium. The smaller the put-in weight of oysters, the more water is added by the canner to form a packing medium. (R. 781, 827, 831, Ex. 28, 33)

16. Canned oysters which yield from the No. 1 can a drained weight of 5 ounces are slack-filled.[4] As the drained weight of oysters is increased above 5 ounces, up to 7 ounces, only minor difficulties are encountered by the canner. No new equipment is necessary; no change in canning procedure is required. It is only necessary for the employees filling the empty cans to place more oysters in those cans as they start down the packing line. It may be necessary to use more care to prevent salt tablets from bouncing out of the cans. Sometimes a portion of the top oyster is clipped off by the sealing operation. This frequently occurs with a fill designed to yield 5 ounces drained weight but the relative incidence of clipping between a fill designed to yield 5 ounces and one devised to yield 6½ ounces is not shown by the record. (R. 775, 779, 786, 803, 806, 808, 823, 832, 848, 854, 861, 866, 869, 871, 875, 908, 1113, 1115, 1117–1124, Ex. 32)

17. The factors of quality in canned oysters that are most important to consumers are not disclosed by the record. The appearance factors discussed in the record and referred to as twisted and broken oysters, browning, and pressure are factors which were emphasized by a committee appointed by Pacific oyster canners to show why they should not be required to increase the fill of container that has been used by them. Except for pressure, the other conditions—twisted and broken oysters and browning—occur regularly in cans filled to yield 5 ounces drained weight. With slack-filled cans, the condition called pressure naturally is not encountered. Based on the number of oysters showing these defects, there is no real difference between canned oysters filled to yield 5 ounces of drained weight and those filled to yield 6½ ounces drained weight whether oysters were pre-steamed or blanched. On a can basis, the can with more oysters tends to have more damaged oysters than a can with fewer oysters, since the percentage of oysters damaged in the canning procedure is about the same without respect to fill. (R. 204, 214–218, 785, 786, 881, 912, 918, 983–985, Ex. 19, 33)

18. Except for slight differences in flavor and appearance, the food value of the liquid packing medium taken from canned oysters is approximately the same in cans having the same drained weight of oysters, regardless of method of preparing the oysters for canning. As drained weight increases, the quantity of liquid packing medium decreases. This decrease is due to less water being added to fill empty spaces in the can before sealing. The flavor and food value of the liquid packing medium, however, is inversely proportional to the amount of water added as a packing medium. (R. 823, 830, Ex. 33)

Conclusions. The following additional conclusions are made on the basis of the evidence of record and the foregoing findings:

There is no basis for making separate standards of fill of container for canned oysters based upon the method of preparing oysters for canning.

It will not promote honesty and fair dealing in the interest of consumers to

[3] By variations of salinity of brine, temperature and time of heating, the loss of liquid may be as great as, or even greater than, with presteaming. (R. 768, 771, 826, 877, 907, 1042, 1062, 1129, 1143)

[4] This is very graphically shown by Exhibit 32.

base the fill of container requirement for canned oysters on the amount of oyster meat put into the can before processing, or on the method used in preparing oysters for canning.

It will promote honesty and fair dealing in the interest of consumers to base the fill of container requirements on the drained weight of oysters and to require the same drained weight whether the oysters used were packed into the can raw or were blanched or were presteamed in the shell before placement in cans.

A reasonable requirement for canned oysters packed with the blanching process which will promote honesty and fair dealing in the interest of consumers is that the drained weight of oysters be not less than 59% of the water capacity of the can.

It is ordered, That no change be made in the definition and standard of identity for canned oysters or in the standard of fill of container established by my final order of March 10, 1948.

(Secs. 401, 701, 52 Stat. 1046, 1055; 21 U. S. C. 341, 371)

Dated: August 3, 1948.

J. DONALD KINGSLEY,
Acting Administrator.

[F. R. Doc. 48-7279; Filed, Aug. 11, 1948; 8:52 a. m.]

Department of the Interior

AMENDMENTS TO ALASKA COMMERCIAL FISHERIES REGULATIONS: The Assistant Secretary of the Interior in the Federal Register of July 29 ordered miscellaneous amendments to the regulations pertaining to the Alaska Commercial Fisheries.

As a result of investigations by field personnel of the Fish and Wildlife Service, it has been determined that Dushkin Lagoon is not a spawning area and that fishing therein will enable full utilization of the resource and will not be harmful to the runs of salmon in Volcano Bay.

Furthermore it has been determined by field biologists that the herring population of the Prince William Sound-Resurrection Bay region is of larger size and composed of older age fish than was anticipated and, therefore, can yield without injury an additional 30,000 barrels to the commercial fishery.

Accordingly Dushkin Lagoon was reopened to salmon fishing during the open season for the entire area which closed August 12, 1948. The herring catch limitation in the Resurrection Bay and Prince William Sound areas was increased from 150,000 to 180,000 barrels for the period of June 15 to August 20, 1948.

CATCH QUOTA FOR KODIAK HERRING INCREASED: An increase of 30,000 barrels in the controlled catch quota for the Kodiak Island herring fishery was announced October 5, by the Fish and Wildlife Service's Branch of Alaska Fisheries. This amendment to the Alaska commercial fisheries regulations became effective immediately upon publication in the Federal Register of October 8, 1948.

Requests by the fishing industry and investigations by Service biologists in Alaska prompted the Service to increase the controlled catch quota for the second time since the opening of the 1948 herring season on July 1.

The original 1948 quota was set at 300,000 barrels. On September 3, the quota was increased to 360,000 barrels; it was filled by the end of September. This second increase brings the total 1948 controlled catch quota for Kodiak herring to 390,000 barrels.

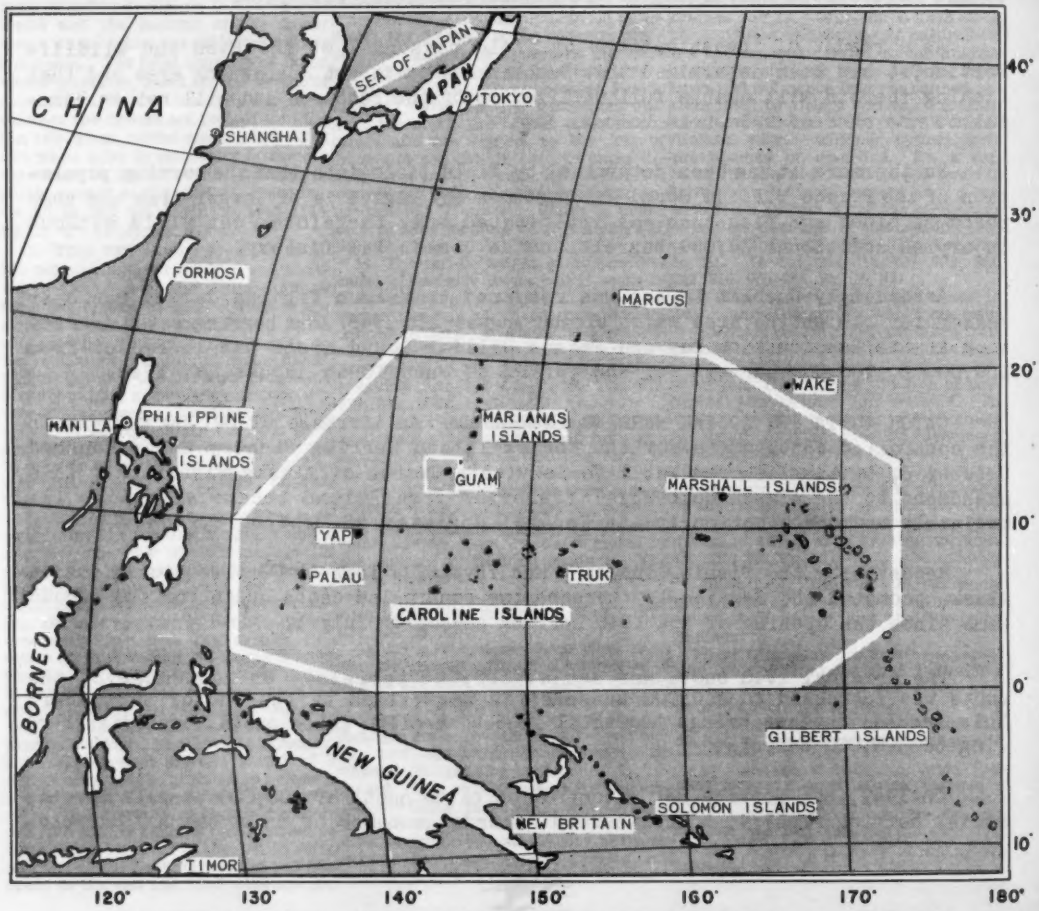
In 1947, the Service set a controlled catch quota of 400,000 barrels for the Kodiak herring fishery, but fishermen recorded a catch of only 388,000 barrels.

Interstate Commerce Commission

HEARING ON FREIGHT RATE INCREASE: The Interstate Commerce Commission announced on October 7, that it would hold an open hearing commencing November 30, 1948, at its offices in Washington,D.C., on the railroad's petition for an additional eight percent increase in freight rates. This case is docketed as ExParte 168. Officials of the Fish and Wildlife Service are working with the Department of Agriculture in preparing data to be used in presenting the fishing industry's case in connection with these hearings for increased freight rates.

Department of State

FISHING IN THE TRUST TERRITORY OF THE PACIFIC ISLANDS: The policy of this Government relating to commercial fishing operations in the United States Trust Territory of the Pacific Islands was announced September 29, by the Department



U. S. TRUST TERRITORY--MARSHALL AND CAROLINE ISLANDS AND MARIANAS, EXCLUDING GUAM

of State. (The United States Trust Territory of the Pacific Islands consists of islands formerly held by Japan under mandate in accordance with Article 22 of the Covenant of the League of Nations. These islands consist of some 98 islands and island clusters in the Marshalls, Marianas, excluding Guam, and Carolines, and have a total land mass of 846 square miles and a total population of about 48,000 local inhabitants.) The policy was approved by the Departments of State, Army, Navy, Air Force, and Interior as a guide to the administration of the Trust Territory and will have the effect of opening the area to commercial fishing. Rich fishery resources, particularly tuna, are available in the waters around this Territory in an area as large as the continental United States. The Territory, itself, contains scarcely as much land area as the State of Delaware. Several commercial fishing companies have shown interest in beginning fishing operations immediately. It is possible that an industry can be built on the fishery resources that will eventually pay a considerable part of the administrative cost of the Territory.

Fishing operations will be under the strict control of the High Commissioner of the Trust Territory in order that the welfare of the native inhabitants can be safeguarded and the harvesting of the resources can be undertaken along adequate conservation lines.

Fishing opportunities will be equally available to the fishing enterprises of all nations except that the High Commissioner will have discretion in excluding enterprises for reasons of security or for the purpose of carrying out the obligation to promote the advancement of the inhabitants.

The text of the policy directive is as follows:

a. With a view to cooperating in the effort to increase world food production and in order to improve the local economy and to obtain information needed for conservation of fishing resources of the area, the territorial waters surrounding the Trust Territory, except those parts closed for security reasons, should be open to the commercial fishing enterprises of all nations on a non-discriminatory basis, except that whenever a country denies rights with respect to fishing and ancillary operations needed and desired by the local inhabitants of the Trust Territory, the Government of the Trust Territory may, if necessary to obtain those rights, deny that country rights in the Trust Territory.

b. The administering agency, in collaboration with the Fish and Wildlife Service of the Department of the Interior should conduct research as soon as possible with a view to establishing conservation regulations. Fishing grounds within the territorial waters found to be necessary for the local economy should be reserved exclusively for the use and benefit of the local inhabitants.

c. Immediate steps should be taken to foster the development of aquatic resources, including locally owned and operated commercial fishing, bait culture, and ancillary commercial industries.

d. With respect to canning and other fish processing industries, the administering agency should give priority to the development of locally owned and operated enterprises.

e. The administering agency may, under such conditions, as may be agreed upon by the interested departments, grant permission for the establishment and maintenance of shore facilities to outside canneries and other fish processing industries provided that, in determining whether such permission shall be granted and in establishing the conditions under which such permission is to be granted, the interests of the local inhabitants shall be paramount.

f. Annual licenses should be required of all commercial fishing vessels operating within territorial limits or operating out of local ports. Licenses to non-local fishing vessels should be granted on the understanding that they are subject to revocation or modification wherever security interests or the interests of the inhabitants so require. Licensees should be required to furnish such statistical information regarding fishing operations as the administering agency, in collaboration with the Fish and Wildlife Service, shall deem appropriate.

g. Local inhabitants should be employed in the complement of a fishing vessel or canning or other ancillary industry licensed for operation in a Trust Territory to the maximum extent consonant with efficient operations. Regulations should be issued prescribing minimum and non-discriminatory wages and standards of working conditions and otherwise protecting locally hired personnel. The employment of non-local personnel in shore establishments should be subject to regulations by the government of the Trust Territory.

h. Except as provided in paragraph a above, and subject to the right of the High Commissioner of the Trust Territory of the Pacific, within established governmental policy to exclude any individual or group of individuals for reason of security, and the obligation to promote the advancement of the inhabitants, the principle of non-discrimination on the basis of nationality shall be observed in the implementation of the foregoing principles and shall apply to all aspects of commercial fishing and ancillary operations and the regulation thereof in the Trust Territory.

QUICK-FREEZING DEFINED

The British Ministry of Food has issued the following definition of quick-freezing:

(a) A quick-frozen fish product is one no part of which took more than two hours to cool from 32° F. to 23° F.;

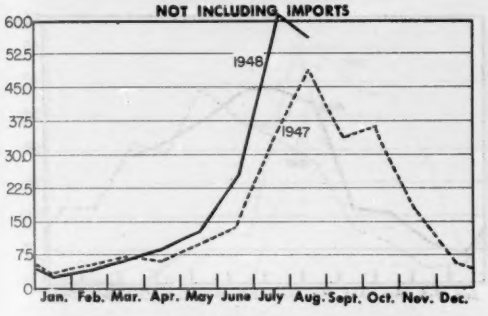
(b) A quick-freezing plant is one that is capable of fulfilling the definition (a) given above when dealing with whole fish, or with regularly shaped packs or packages of fillets in molds, cardboard boxes, or normal light-wrapped (cellophane, waxed papers, etc.) the specified cooling range being measured by thermocouples placed at the center of each package.

LANDINGS AND RECEIPTS

In Millions of Pounds

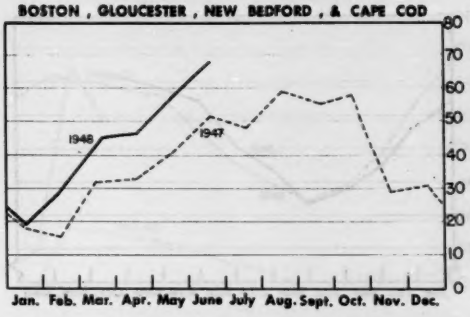
MAINE - LANDINGS *

NOT INCLUDING IMPORTS



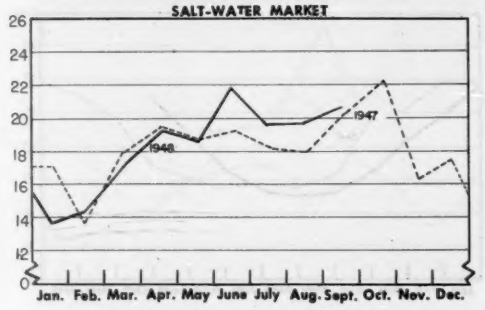
MASSACHUSETTS - LANDINGS

BOSTON, GLOUCESTER, NEW BEDFORD, & CAPE COD



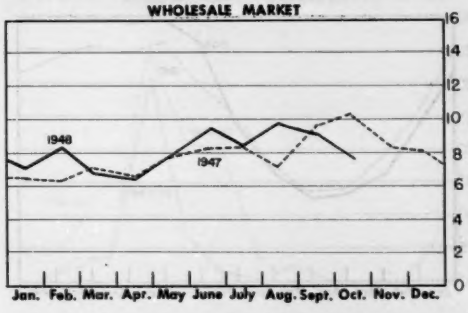
NEW YORK CITY-RECEIPTS OF FRESH & FROZEN FISH

SALT-WATER MARKET



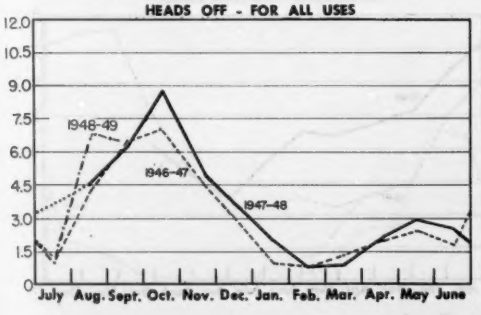
CHICAGO - RECEIPTS OF FRESH & FROZEN FISH

WHOLESALE MARKET



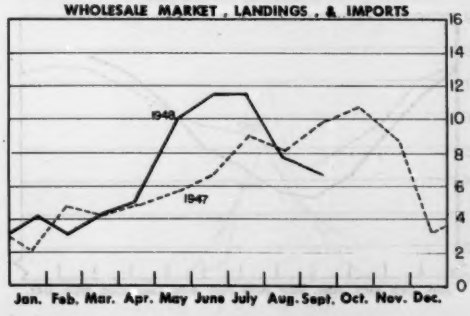
GULF - SHRIMP LANDINGS

HEADS OFF - FOR ALL USES



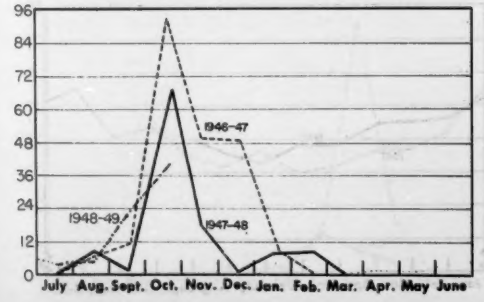
SEATTLE - RECEIPTS OF FRESH & FROZEN FISH

WHOLESALE MARKET, LANDINGS, & IMPORTS

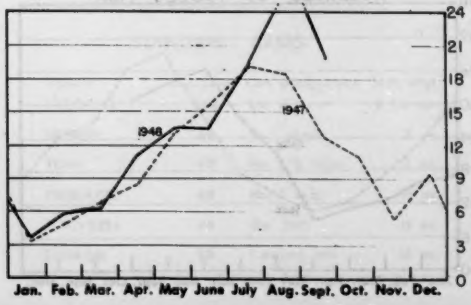


In Thousands of Tons

CALIFORNIA - PILCHARD LANDINGS



CALIFORNIA - TUNA LANDINGS

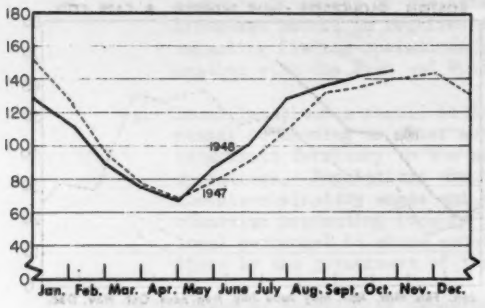


.....ESTIMATED
*REVISED

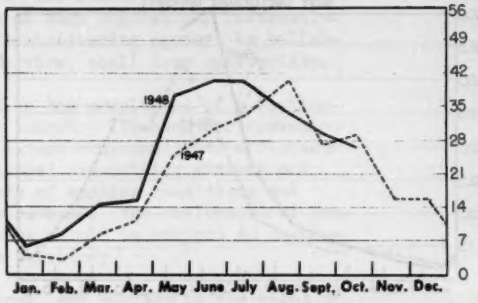
COLD STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS

In Millions of Pounds

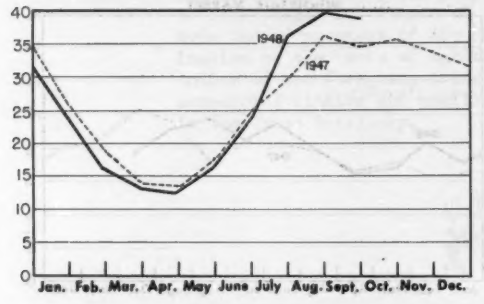
U.S. & ALASKA - HOLDINGS OF FROZEN FISH



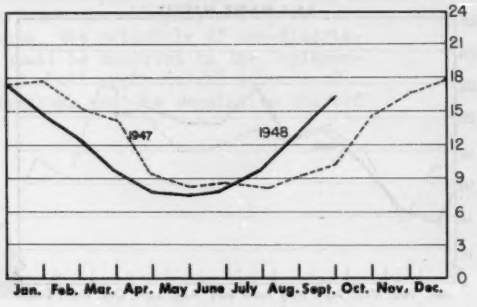
U.S. & ALASKA - FREEZINGS



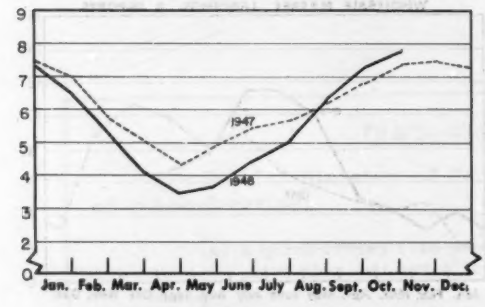
NEW ENGLAND - HOLDINGS OF FROZEN FISH



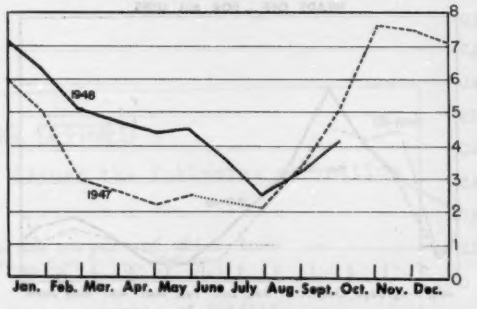
NEW YORK CITY - HOLDINGS OF FROZEN FISH



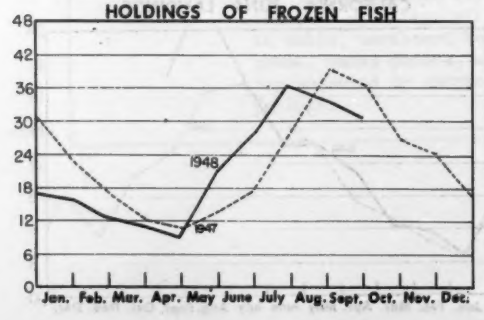
CHICAGO - HOLDINGS OF FROZEN FISH



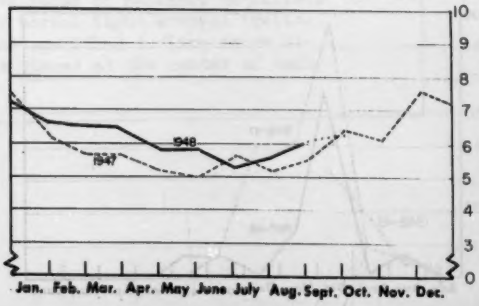
GULF - HOLDINGS OF FROZEN FISH



WASHINGTON, OREGON, AND ALASKA - HOLDINGS OF FROZEN FISH



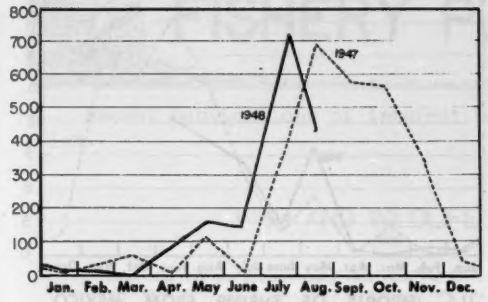
CALIFORNIA - HOLDINGS OF FROZEN FISH



CANNED FISHERY PRODUCTS

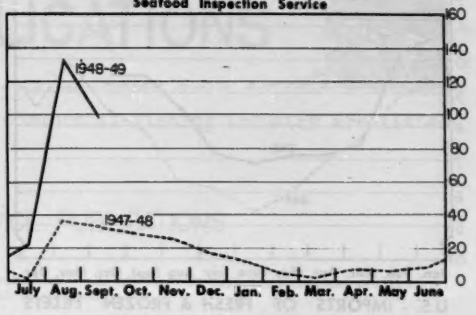
In Thousands of Standard Cases

MAINE - SARDINES, ESTIMATED PACK *

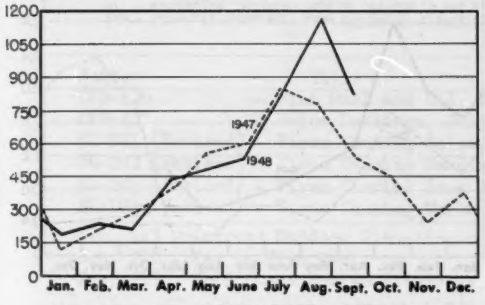


UNITED STATES - SHRIMP

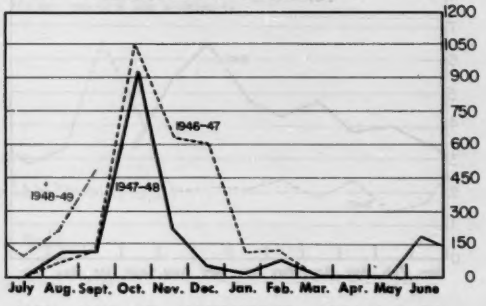
Plants under Food and Drug Administration
Seafood Inspection Service



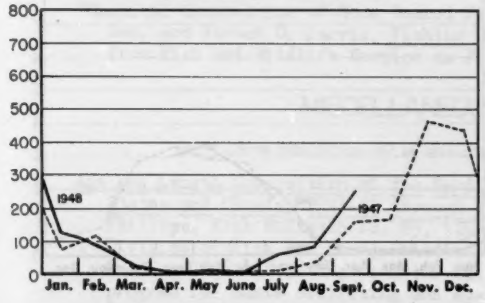
CALIFORNIA - TUNA



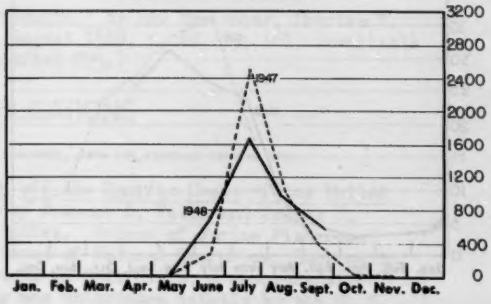
CALIFORNIA - PILCHARDS



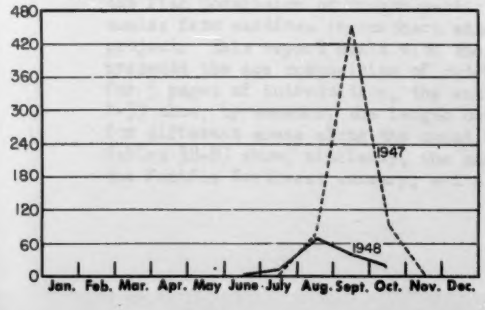
CALIFORNIA - MACKEREL



ALASKA - SALMON



WASHINGTON - PUGET SOUND SALMON *



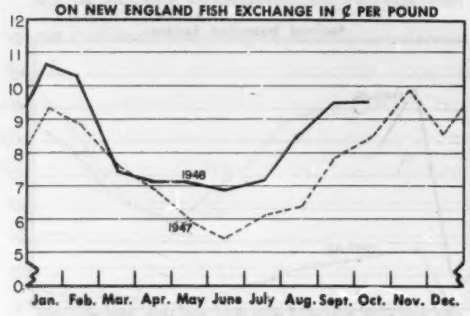
STANDARD CASES

Variety	No. Cans	Can Designation	Net. Wgt.
SARDINES	100	1/4 drawn	3 1/4 oz.
SHRIMP	48	No.1 picnic	7 oz.
TUNA	48	No. 1/2 tuna	7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
MACKEREL	48	No. 300	15 oz.
SALMON	48	1-pound tall	16 oz.

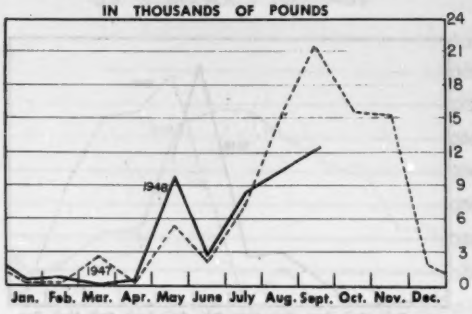
..... ESTIMATED
*REVISED

PRICES, IMPORTS and BY-PRODUCTS

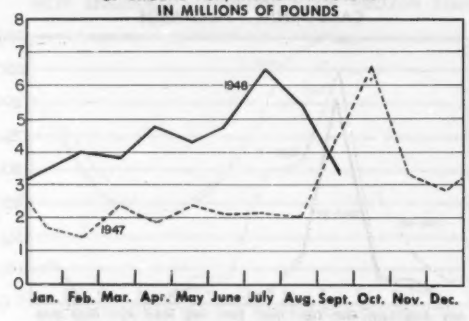
BOSTON - WEIGHTED AVERAGE PRICE
ON NEW ENGLAND FISH EXCHANGE IN ¢ PER POUND



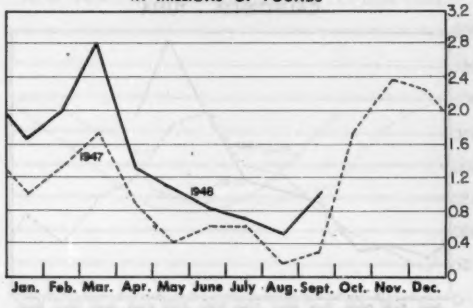
MAINE - IMPORTS OF SEA HERRING
IN THOUSANDS OF POUNDS



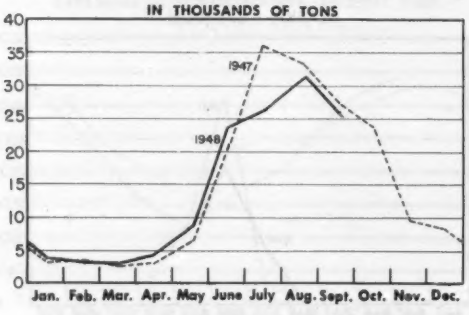
U.S. - IMPORTS OF FRESH & FROZEN FILLETS
OF GROUND FISH, INCLUDING ROSEFISH:-
IN MILLIONS OF POUNDS



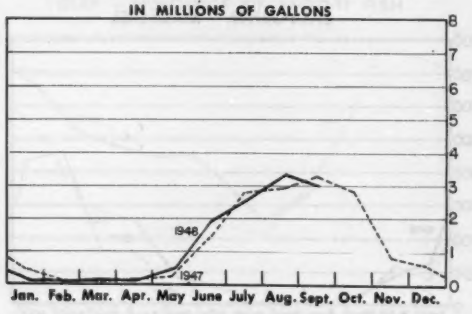
U.S. - IMPORTS OF SHRIMP FROM MEXICO
IN MILLIONS OF POUNDS

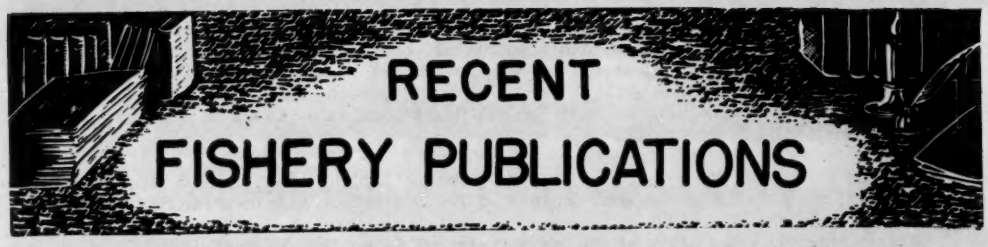


U.S. & ALASKA - PRODUCTION OF FISH MEAL
IN THOUSANDS OF TONS



U.S. & ALASKA - PRODUCTION OF FISH OIL
IN MILLIONS OF GALLONS





Recent publications of interest to the commercial fishing industry are listed below.

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
FL - FISHERY LEAFLETS.
MDL - MARKET DEVELOPMENT SECTION LISTS OF DEALERS, LOCKER PLANTS, ASSOCIATIONS, ETC.
SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
SEP. - SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number	Title
CFS-426	- Fish Meal and Oil, July 1948
CFS-427	- Maine Landings, July 1948
SL-101 (Revised)	- Firms Canning Salmon, 1947
SL-102 (Revised)	- Firms Canning Sardines, 1947
SL-103 (Revised)	- Firms Canning Tuna and Tuna-Like Fishes, 1947
SL-104 (Revised)	- Firms Canning Mackerel, 1947
Sep. 217	- Current Haddock Situation on Georges Bank
Sep. 218	- Fat in Fish Meal
Sep. 219	- Gulf Coast Shrimp Fisheries, January-June, 1948

ARTICLES BY FISH AND WILDLIFE SERVICE AUTHORS IN OTHER PUBLICATIONS

"Chemical Composition of Some Canned Fishery Products," by Ray Treichler, Charles F. Lee, and Norman D. Jarvis, Fishing Gazette, August 1948, p. 62, 73, 101. (Available from Fish and Wildlife Service as Fishery Leaflet 295.)

MISCELLANEOUS PUBLICATIONS

THE FOLLOWING PUBLICATIONS MAY BE OBTAINED, IN MOST INSTANCES, FROM THE AGENCIES ISSUING THEM.

Age and Length Composition of the Sardine Catch off the Pacific Coast of the United States and Canada, 1941-42 through 1946-47, by Frances E. Felin and Julius B. Phillips, Fish Bulletin No. 69, 126 p. and tables. Bureau of Marine Fisheries, Division of Fish and Game, California Department of Natural Resources, Sacramento, Calif., 1948. Starting with the 1941-42 season in California, a comprehensive program for scale collecting and age reading was undertaken jointly by the U. S. Fish and Wildlife Service and the California Division of Fish and Game. The Fisheries Research Board of Canada, the Washington State Department of Fisheries, and the Fish Commission of Oregon participated in the work of adding the collection of scales from sardines in northern waters, which were included in the age-reading project. This report deals with the first six seasons of age determinations and presents the age composition of catch without interpretation of the data. Except for 5 pages of introduction, the entire report consists of 100 tables. Tables 1-37 show, by seasons, the length composition of each age group in the samples for different areas along the coast in British Columbia, Washington, and Oregon; Tables 38-87 show, similarly, the same data for California by ports together with the Pacific Northwest summary, and a summary for the entire coast. Tables 88-93

give age composition of the catch in terms of numbers of fish caught in each port in California and in each separate political subdivision of the Pacific Northwest; Tables 94-99 show, by seasons, the mean length and standard error of the mean, and the number of fish upon which these are based for each year-class in each of the major regional subdivisions; and Table 100 shows calendar dates of lunar months for seasons 1941-42 through 1946-47.

"All the Fishes in the Sea," article, by J. Rodger Darling, Fauna, March 1948, vol. 10, no. 1, p. 3-8. The Zoological Society of Philadelphia, Philadelphia, Pa.

Catastrophic Mass Mortality of Marine Animals and Coincident Phytoplankton Bloom on the West Coast of Florida, November 1946 to August 1947, by Gordon Gunter, R. H. Williams, C. C. Davis, and F. G. Walton Smith, Contribution No. 14, 25 p. with figures and tables, printed. Marine Laboratory, The University of Miami, Coral Gables, Florida. Reprinted from Ecological Monographs, 18: 309-324, July 1948. Contains the observations, discussion, and summary of certain observations made by members of the staff of the Marine Laboratory of the University of Miami throughout the 1946-47 sequence of outbreaks of mortality of fishes and other marine animals on the lower west coast of Florida.

"The California Sea Lion Census for 1947," by Paul Bonnot and Wm. E. Ripley, article, California Fish and Game, July 1948, vol. 34, no. 3. p. 89-92, free, Division of Fish and Game, California Department of Natural Resources, San Francisco, Calif.

Common Marine Fishes of California, by Phil M. Roedel, Fish Bulletin No. 68, 154 p. with photos. Bureau of Marine Fisheries, Division of Fish and Game, California Department of Natural Resources, Sacramento, Calif., 1948. This bulletin is designed to provide authorized names for the more common marine fishes of California, and as a ready reference from which the fisherman or buyer can identify those species seen most often in the California commercial and the sport fisheries catch. It contains those species appearing with reasonable frequency in either the sport or the commercial catch giving for each species the official common name, unauthorized names, photo, relationship, distinguishing characteristics, distribution, fishing season, importance, and fishing gear used. In addition, the bulletin contains a list of official common names, notes on fishing gear, and a key for identifying the more common marine fishes found in the sport and commercial catch of California.

Current Fisheries Market Review and Outlook, 21 p. processed. Canadian Department of Fisheries, Ottawa, Canada, October 1948. Published for the information of the fishing industry, this booklet is a comprehensive analysis of the available information affecting markets for Canadian fishery products. It includes the following articles: "The Economic Situation in World Markets," "The World Food Situation," and "The Marketing of Canadian Fish." Similar reviews will be issued periodically.

European Programs of Agricultural Reconstruction and Development. Food and Agriculture Organization of the United Nations, Washington - Geneva, June 1948, 60 pages with tables, printed, price $1.00. The purpose of this report is to delineate the general lines of the present programs of European nations for further agricultural reconstruction and development up to about 1950-51, to appraise some of the problems and difficulties which may arise in carrying these programs through, and to indicate fields in which action might be taken on national, European, and world levels to deal with these problems. The report mentions, only incidentally, the outlook for fisheries and the problems of the fishing industry.

Fish Commission Research Briefs, No. 1, Vol. 1, 23 p.; printed. Fish Commission of Oregon, Portland, Ore., April 1948, free. Short reports intended to inform public, industry, and other interested parties of the current studies of the Fish Commission and the basis for Oregon's conservation measures. Will be published three or four times a year when studies are sufficiently complete to provide reliable biological evidence for conclusions upon which regulations are based. This booklet contains brief articles outlining the Biological Research Program of the Oregon Fish Commission; the Winter Steelhead Run of the Umpqua River, 1946-1947; Vitamin A Content of Hake Livers and Viscera; and Size of the Wallamette River Spring Chinook Salmon Run, 1947.

Foreign Market Notes--Fish and Fish Products (Arthur M. Sandberg Reports on the Market Situation in France, the United Kingdom, and Ireland), Foreign Agriculture Circular, October 25, 1948, 4 p., mimeographed. Office of Foreign Agricultural Relations, U.S. Department of Agriculture, Washington, D. C., free. Preliminary report of a study of foreign market outlets for and competition with United States fish and fish products, conducted under the provisions of the Research and Marketing Act.

Fourth Annual Report 1947, 204 p., illus, with photos and tables, printed. Maryland Board of Natural Resources, State Office Building, Annapolis, Md., December 1947. Presents the operations of the various Maryland conservation departments associated with the Board of Natural Resources for the fiscal year 1947, and includes those departments concerned with commercial and sport fishing. This report gives the background of and the Maryland legislation affecting commercial fishes, the crab fishery, the oyster fishery, and the Potomac River fishery. In addition, it contains a report on the oyster problem in the Chesapeake Bay. Investigations conducted on fish, oysters, crabs, diatoms, and fresh-water algae are also reported upon. Statistics and catch records of the fish and shellfish produced or landed in the State of Maryland, by species and by gear, are given for the year 1946, except for oysters which are for the fiscal year 1947.

The International Trade Organization, report by Hon. James G. Fulton, Pennsylvania and Hon. Jacob K. Javits, New York, 120 p., printed. For the use of the Committee on Foreign Affairs, 80th Congress, 2nd Session. It is an appraisal of the Havana Charter in relation to the United States Foreign Policy, with a definitive study of its provisions, and attempts to give assistance regarding the complex problems involved in developing a better pattern for world trade. The first section relates the essential facts of the sequence of events in the development of the charter of the proposed International Trade Organization; the second, states briefly the provisions of the charter in relation to its main aims and in relation to current practices of the U. S. Government; and the third, evaluates the charter in relation to the objectives of United States foreign policy. In addition, the appendix contains the text of the charter. Among other items, the Charter covers regulations and policies on tariffs, imports, exports, and inter-Governmental commodity agreements to be observed by member countries.

Light List Atlantic and Gulf Coasts of the United States, CG-158, 844 p., printed. United States Coast Guard, Treasury Department, Washington, D. C., 1948. This list, published annually and corrected to January 1, 1948, describes all aids to navigation maintained by or under authority of the U. S. Coast Guard, on the Atlantic and Gulf Coasts of the United States, from St. Croix River, Maine, to the Rio Grande and including the U. S. West Indian Islands. Unlighted buoys and daybeacons are given at the end of this list. For sale by the Superintendent of Documents, Washington 25, D. C., $2.25.

Light List Great Lakes, United States, and Canada, CG-159, 306 p., printed. United States Coast Guard, Treasury Department, Washington, D. C., 1948. This list, published annually and corrected to March 1, 1948, describes all aids to navigation and fog signals maintained by or under the authority of the U. S. Coast Guard and the Dominion of Canada on the Great Lakes and the St. Lawrence River above St. Regis River. In addition, it includes, at the end, a list of unlighted buoys and daybeacons in the U. S. waters. For sale by the Superintendent of Documents, Washington 25, D.C., $1.00.

Light List Intracoastal Waterway of the United States, CG-135, 235 p. printed. United States Coast Guard, Treasury Department, Washington, D. C., 1948. This list, published annually and corrected to June 1, 1948, describes all aids to navigation maintained by or under authority of the United States Coast Guard on the Intracoastal Waterway and inside waters on the Atlantic and Gulf Coasts of the United States, from Norfolk, Va. to the Rio Grande. For sale by the Superintendent of Documents, Washington 25, D. C., 60 cents.

Light List Pacific Coast of the United States, CG-162, 444 p., printed. United States Coast Guard, Treasury Department, Washington, D. C., 1948. This list, published annually and corrected to January 1, 1948, describes all aids to navigation and fog signals maintained by or under authority of the U. S. Coast Guard on the Pacific Coast of the United States, and on the coasts of Alaska and the Hawaiian and outlying Pacific islands. Unlighted buoys and daybeacons in U. S. waters are at the

end of this list. It also includes the lighted aids to navigation on the coast of British Columbia, maintained by the Canadian Government. For sale by the Superintendent of Documents, Washington 25, D. C., $1.00.

1947 Annual Bulletin, Bulletin No. 47, 150 p., illus.-photos., graphs, tables; printed. Washington Department of Fisheries, Seattle, Wash., August 1948. Includes report of the Technology, Biology, Hatchery, Stream Improvement, and other divisions. The investigations on the Puget Sound salmon, oysters, razor clams, crabs, and Columbia River are presented and dicussed. Statistics on fishery production for Puget Sound, Columbia River, Grays Harbor, and Willapa Harbor districts are given combined and individually. A summary of orders of the Director of Fisheries promulgated since January 1, 1947, and a list of recommendations, are also included.

A Preliminary Population Study of the Yellowfin Tuna and the Albacore, by H. C. Godsil, Fish Bulletin No. 70, 94 p. with figures and tables, printed. Bureau of Marine Fisheries, Division of Fish and Game, California Department of Natural Resources, Sacramento, Calif., 1948. Although the two species of tuna reported in this bulletin are discussed separately, the introductory remarks and necessary explanations are for both species since the problems for both are so similar and the method of investigation identical. The report contains a brief description of the scope of the two investigations; the methods used and the reasons governing their selection; the results of the two individual studies; and an appendix which presents miscellaneous data which may be of interest to other workers.

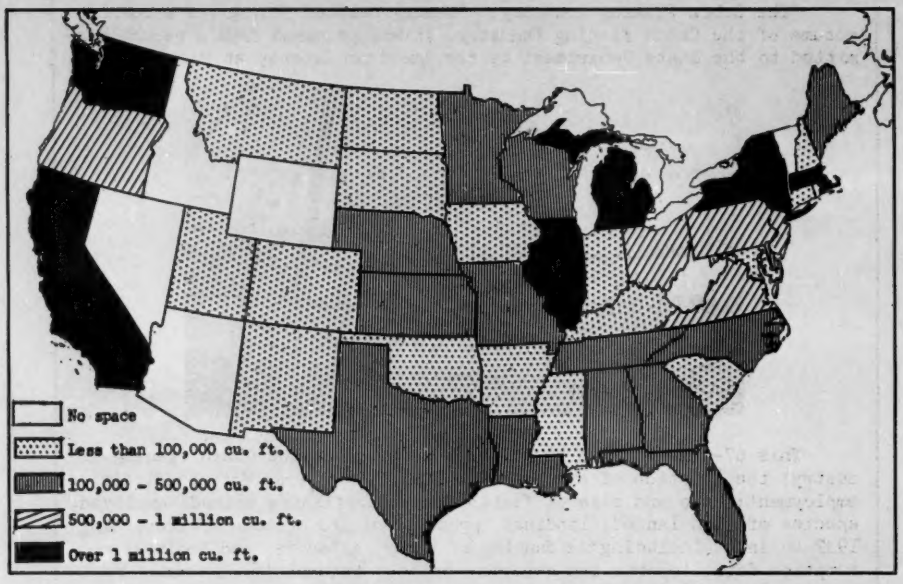
Regulation and Investigation of the Pacific Halibut Fishery in 1947, No. 13, 35 p., printed. Report of the International Fisheries Commission, Seattle, Wash., 1948. A general review of conditions and events in the Pacific halibut fishery and of the Commission's regulatory and investigational activities in 1947. Since the Commission has not heretofore published annual reports, this report includes some background material. In addition, it contains an appendix which gives the Pacific halibut fishery regulations, effective as of March 17, 1947.

The State of Food and Agriculture--1948 (A Survey of World Conditions and Prospects) C/48/8, 216 p. with tables and charts, printed. Food and Agriculture Organization of the United Nations, Washington, D. C., September 1948. A report prepared by the FAO at the request of member governments as a basic document for the intergovernmental consultations on plans and programs at the Fourth Session of the FAO Conference in November in Washington, but it is also addressed to the general public. It contains a chapter on fisheries products as well as a tabulation of the per capita consumption of fishery products in European countries, Australia, New Zealand, Canada, and the United States. Whaling statistics are found in the section covering fats and oils as well as in the chapter on fisheries products. This publication may be obtained for $2.00 from the Food and Agriculture Organization, Longfellow Building, Washington, D.C.

Supplement 1 to United States Import Duties (1948), Miscellaneous Series TC 1.10: Im. 7/4/48 Supp. 1, 16 p., August 1, 1948, printed. U. S. Tariff Commission. Contains all changes in duty since June 15, 1948, up to and including August 1, 1948. Lists fish and fishery products among other items. Most of the new changes in duties result from Presidential proclamations making effective additional tariff concessions made by the United States provided for in the General Agreement on Tariffs and Trade negotiated last year at Geneva. Persons who already have the original document can obtain copies of the supplement without cost on request. New purchasers of the original document, United States Import Duties (1948), from the Government Printing Office, Washington 25, D. C., price $2.00, will receive a copy of the supplement without additional charge.

"Surveys of World Fisheries," Fisheries Bulletin, September 1948, vol. 1, no. 2, p. 46-52. Food and Agriculture Organization of the United Nations, Washington, D. C. This article covers the British West African Colonies, Protectorates, and Trust Territories--Gambia, Sierra Leone, Gold Coast, Togoland, Nigeria, and British Cameroons. In future issues of the Fisheries Bulletin, similar surveys will be undertaken. In the beginning, attention will be mainly focused on those areas about which relatively little information has yet been made available.

DISTRIBUTION OF NET COLD STORAGE SPACE SUITABLE FOR STORING FISH, BY STATES, OCTOBER 1, 1947



COLD STORAGE SPACE IN WAREHOUSES HANDLING FISH, OCTOBER 1, 1947

State or Region	No. of firms	Freezer 29° F. and below	Cooler Above 29 through 50° F.
		1,000 cu. ft.	1,000 cu. ft.
Maine	4	169	-
Massachusetts	16	1,341	468
Other States	2	10	4
New England	22	1,520	472
New York	22	1,604	502
New Jersey	9	768	83
Pennsylvania	19	644	106
Middle Atlantic	50	3,016	691
Ohio	15	571	6
Indiana	5	77	2
Illinois	7	862	235
Michigan	10	686	429
Wisconsin	6	168	40
E. North Central	43	2,364	712
Minnesota	6	342	39
Iowa	5	44	-
Missouri	5	239	-
Nebraska	4	121	3
Other States	5	117	4
W. North Central	25	863	46
Maryland	3	65	-
Virginia	6	413	138
Georgia	6	100	1
Florida	6	140	-
Other States	6	171	202
South Atlantic	27	889	335
Tennessee	10	221	2
Alabama	4	103	-
Other States	4	50	104
E. South Central	18	374	106
Louisiana	5	112	-
Texas	13	127	4
Other States	2	25	-
W. South Central	20	264	4
Colorado	3	33	25
Other States	6	45	2
Mountain	9	78	27
Washington	13	938	491
Oregon	7	577	55
California	21	1,409	83
Pacific	41	2,924	629
U. S. Total	255	12,292	3,022

This refrigerated space survey does not cover (1) storage space occupied by lockers of 25 cubic feet or less; (2) space owned by wholesale and retail distributors who do not store food for a period of thirty days or longer; (3) space in a plant operated as a part of a retail food business, hotel, or other establishment where persons are housed or fed; (4) space in plants owned and operated by the Armed Services.

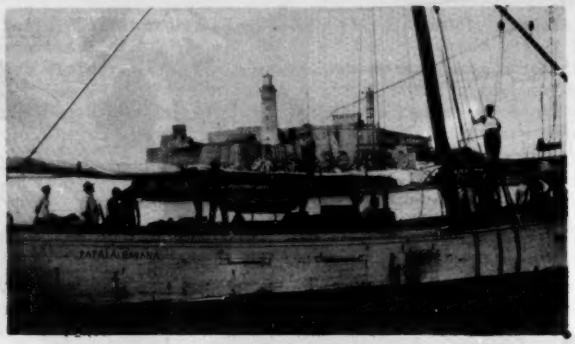
Source: Production and Marketing Administration, U. S. Department of Agriculture

Processing -- Miscellaneous Service Division

Illustrator -- Gustaf T. Sundstrom **Compositors -- Margaret C. Harris and Norma D. Loeffel**

THE CUBAN FISHING INDUSTRY

"The Cuban Fishing Industry," Fishery Leaflet 308, gives a complete resume of the Cuban fishing industry. It was prepared from a report submitted to the State Department by the American Embassy at Habana, Cuba.



This 67-page leaflet gives the background of the Cuban fishing industry; the location of the principal fishing centers; data on fisheries employment; type and size of fishing vessels; fishing methods employed; species of fish landed; landings, production, and methods of processing, 1937 to date (including the canning of tunny, albacore, and bonito); consumption data; imports and exports; prices; international trade; regulations and policies; internal trade patterns; type of fishery research conducted in Cuba; production figures of the leading Cuban fishing ports; a detailed list of the Cuban breeding grounds and fisheries, including type of grounds and kinds of fish obtainable; and statistical information in the form of tables.

In addition, this leaflet contains a Cuban outlook summary, the rates of duty applying on fish imports into Cuba, a list of the names and addresses of Cuban importers of canned and cured fish, information on the Cuban closed seasons for various species, and a bibliography. The leaflet has several photographs illustrating the various phases of the Cuban fishing industry.

Fishery Leaflet 308 may be obtained upon request, without charge, from the U. S. Fish and Wildlife Service, Washington 25, D. C.

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DEPARTMENT OF THE INTERIOR
FISH AND WILD LIFE SERVICE
WASHINGTON 25, D. C.

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